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Geology of Schreiber–Terrace Bay Area District of Thunder Bay

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Geology of Schreiber-Terrace Bay Area
District of Thunder Bay

by

M.W. Carter

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V.G. Milne

V.G. Milne, Director
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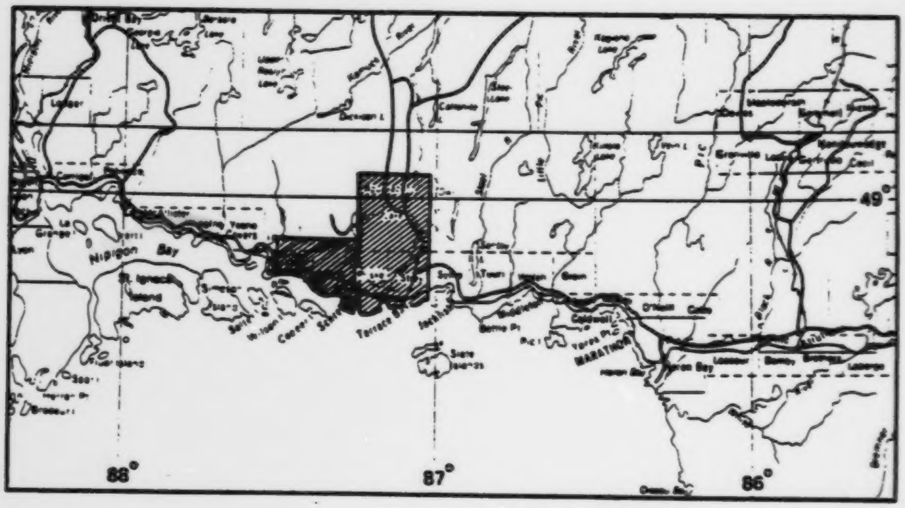
ABSTRACT



Scale: 1:1,584,000 or 1 inch to 25 miles

Figure 1: Key map showing the location of the Schreiber-Terrace Bay area

This report describes the geology and mineral deposits of the Schreiber-Terrace Bay Area in the District of Thunder Bay. The region covers an area of approximately 802 km2 and include within its boundaries the towns of Schreiber and Terrace Bay, and a portion of the north shore of Lake Superior. Highway 17 passes through the area.

The consolidated rocks of the map-area are of Precambrian age and range from Archean to Proterozoic.

The Archean rocks of the Wawa Subprovince are predominantly subaqueous mafic tholeiitic metavolcanics which overlie a less voluminous, predominantly calcalkalic sequence, both of which are interlayered with minor clastic and chemic metasediments. Two volcanic cycles are present separated by a marker horizon of sulphide-facies ironstone. The lower cycle exceeds 2.3 km in thickness and underlies the southern margin of the map area, south of Highway 17. It consists of interlayered tholeiitic basalts and calcalkalic andesite and dacite and tholeiitic or calcalkalic rhyolite. The upper cycle is in excess of 12 km thick and underlies much of the northern part of the map-area north of Highway 17. The upper cycle consists predominantly of tholeiitic basalt with subordinate calcalkalic andesite and dacite, and tholeiitic or calcalkalic rhyolite. These rocks are folded about an east-southeast trending synclinal axis which plunges to the east-southeast. Wawa Subprovince metavolcanic rocks are overlain, in the northeast of the map-area by metawackes and meta-arenites of the Quetico Subprovince, which are tightly folded along east-west axes. Both subprovinces are intruded by gabbroic rocks, an ultramafic intrusion, granitic batholiths and Archean to Proterozoic diabase dikes following three trends. The grade of metamorphism increases from greenschist facies in the south to amphibolite facies in the north and has affected the metavolcanics, metasediments and mafic intrusions. Contact metamorphism, to pyroxene-hornfels rank, has been superimposed on the greenschist facies by the Terrace Bay Batholith. A pervasive foliation characterizes most of the rocks of both subprovinces, the foliation being parallel to the primary layering in the rocks.

Proterozoic rocks include remnants of Animikie Group clastic and chemical sediments, which outcrop along the north shore of Lake Superior in the southwestern part of the area.

Archean to Proterozoic rocks comprise narrow diabase dikes which cut all the Archean rocks, and diabase sills which intrude the Proterozoic Animikie Group. The sills are Proterozoic in age (Logan sills) and some of the dikes may be of this age.

Cenozoic rocks comprise Pleistocene morainal, glaciofluvial and glaciolacustrine sands and gravels and Recent alluvial deposits.

Faults trending northwesterly, northeasterly and northerly are a characteristic feature of the map-area. A strong vertical component to movement on the faults is interpreted to explain the preservation of supracrustal rocks in the eastern part of the map area.

Mineral deposits comprise precious metal (gold and silver) veins in fractures, and shears associated with the mafic metavolcanic rocks, and the granitic rocks; molybdenum-copper vein deposits associated with the border zones of the granitic batholiths; nickel-copper deposits associated with a gabbro intrusion; and polymetallic base-metal copper-lead-zinc-silver occurrences associated with clastic and chemical interflow metasediments.

GEOLOGY OF

SCHREIBER-TERRACE BAY AREA

DISTRICT OF THUNDER BAY

by

M.W. CARTER[1]

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Geology of
The Schreiber - Terrace Bay Area
District of Thunder Bay

by

M.C. Carter[1]

Introduction

Location and Accessibility

The Schreiber - Terrace Bay area lies in the District of Thunder Bay between the Longitudes of 87°01'37"W and 87°30'W, the north shore of Lake Superior between these Longitudes, and Latitudes 48°55'30"N in the western half of the map area and 49°03'00"N in the eastern half of the region. This area comprises 802 km^2.

Access is good for the southern part of the area which is traversed by Highway 17, The Trans Canada Highway. Most of the western part of the region is accessible by canoe and the access road to the former Zenith Mine, now closed, and a logging road connecting Schreiber and Big Duck Lake, the northern part of which is now completely overgrown. The eastern part of the area is readily accessible by the Kimberly-Clark of Canada Limited logging road. Owing to the use of the Aguasabon River for transporting logs from Timber Operations by Kimberly-Clark of Canada Limited, use of this waterway is only possible with a river boat owned and operated by that company. Areas in the extreme northwestern and northeastern and some central parts, remote from logging roads, can be reached only by fixed wing, float-equipped aircraft and in many cases only by helicopter. A helicopter landing facility is available at the Terrace Bay Municipal Airport, and the nearest commercial seaplane base is at the village of Pays Plat to the west of the map area.

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[1] Geologist, Precambrian Geology Section, Ontario Geological Survey.

Previous Geological Work

Geological investigations began in the area in 1900 when E.V. Neelands (1901) accompanied an Ontario Land Survey party in the Long Lake - Pic River area. This was followed by a reconnaissance geological survey in 1909 of the area between the Pic and Nipigon Rivers by W.H. Collins (1909). In 1920 T.L. Tanton (1920) referred to the geology of the area in his report on the Nipigon-Schreiber District. In the same year P.E. Hopkins (1922) carried out a reconnaissance survey of the Schreiber-Duck Lake area which included the western part of the area mapped by the writer. In 1936 G.A. Harcourt (1939) made a geological examination of the southwestern part of the area, and in 1937 M.W. Bartley (1939) carried out a geological survey of the southeastern part of the area. Then in 1939 M.W. Bartley (1942) mapped the northeastern part of the map area. This was the last systematic mapping in the area before the current project. A field engineering geology terrain study was carried out in the map area in 1978 by J.F. Gartner (1979).

Present Geological Work

Field work for this project was begun in 1979 with the mapping of the area about, and north of Schreiber as far north as Latitude 48°55'30"N. This was followed by mapping in the region about and north of Terrace Bay as far north as Latitude

48°54'00"N in the summer of 1980. In 1981 the region lying between Latitudes 48°54'00"N and 49°03'00"N was mapped to complete the project. Mapping was carried out using vertical aerial photographs at a scale of 1 inch to 1/4 mile or 1:15 840 supplied by the Public Information Centre, Ontario Ministry of Natural Resources, Toronto. Pace and compass traverses were run at intervals of about 1/4 mile for the most part at right angles to the strike of the rocks. Logging roads were also used in the search for outcrop. Geological data were recorded directly onto acetate sheets attached to the aerial photographs carried on the traverses. The data were then transferred to 1 inch to 1/4 mile or 1:15 840 cronaflex base maps compiled by the Cartography Section, Surveys and Mapping Branch, Ministry of Natural Resources made from Forest Resources Inventory maps. Six preliminary, uncoloured, geological maps P. 2390, P. 2391, P. 2417, P. 2418, P. 2556, P. 2557 (Carter 1981a, 1981b, 1981c, 1981d, 1982a, 1982b) covering the whole area were published at a scale of 1 inch to 1/4 mile or 1:15 840.

Acknowledgements

During the field work the author was assisted by Z. Mandziuk, A. Caira, B. Zelenka and R. Robichaud as senior assistants, and K. Neale, J. Young, M. Best, S. Navratil, A. Leroux, W. Wing, D. Conrod, M. Taylor and D. Mann as junior assistants. Their help in carrying out the mapping is greatly appreciated.

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Bay Region, Ontario Ministry of Natural Resources, Thunder Bay) for the first two years of the project; and W.H. McIlwaine, Economist, Northern Development Division (Thunder Bay), Ministry of Northern Development and Mines (then Regional Geologist for the last year of the project), for valuable discussions during the field work.

Physiography

The area mapped is rugged and generally of considerable relief, the maximum difference in elevation being about 350 m. The characteristics of the topography are well seen on the topographic maps of the National Topographic Series (42D/14W, 42D/14E, and 42E/3) of the region. The land generally rises steeply from the valleys and almost shear cliffs 15-25 m high are common. The topographic characteristics of the map area are related to the major lithologic units. Areas underlain by consolidated rocks form the dominant landform and are termed bedrock knobs (Gartner 1979). The most rugged parts of the area are underlain by the volcanic rocks, the ridges and valleys presenting a sharply angular pattern with steep slopes in response to faulting in the central and northeastern parts of the map area. Because of considerable faulting along northwesterly, northeasterly and northerly directions the shapes of the ridges are markedly angular, and in some cases ridges maintain a prominent trend for long distances. Such ridges are seen bordering the tributaries of the Aguasabon River in the northeast, Big Duck Creek in the eastern part of the area, and Sox Creek to the northwest. The most impressive cliff feature can be seen along the western boundary of

Schreiber Peninsula where the cliff is about 60 m high. Regions underlain by granitic rocks are less rugged, the hills in such areas are characterized by rounder slopes and much less angularity. This can be seen in the topography of the southeastern part of the map area between Worthington Bay and Victoria Bay, the area northwest of Walker Lake in the western part of the map area, and in the north-central part of the region centred on Crossman Lake. Less rugged still are the regions underlain by the Quetico metasedimentary rocks occurring along the northern boundary of the eastern half of the region between Southpine Lake and Stingray Lake, where large areas are low lying and swampy.

The flattest areas are those underlain by wide expanses of Pleistocene deposits, where glaciofluvial and glaciolacustrine (Gartner 1979) landforms occur. Glaciolacustrine landforms comprising deltas occur at the mouth of McLean's Creek, at Selim at the mouth of the Whitesand River, and at the town of Terrace Bay. Glacial lake action on the deposits of these deltas has produced a series of beaches and terraces both at Selim and between the town of Terrace Bay and the shore of Lake Superior. Glaciofluvial landforms formed by outwash deposits occur 0.8 km west of McLean's Creek, at Schreiber upon which the town is built, to the southwest, south and southeast of the southern shore of Hays Lake, and along the upper reaches of that part of the Aguasabon River lying within the map area.

Drainage is southerly into Lake Superior, the height of land between the Lake Superior drainage and that of the Hudson Bay system lying just to the north of the map area. The main drainage is carried by McLean's Creek and Whitesand River in the western part of the map area, and the Aguasabon and its major tributary, Big Duck Creek, in the east. The reaches of these creeks and rivers are straight for long distances owing to the influence of faults and lineaments characteristic of the map area. These structural features impose a marked angular pattern to the direction taken by short segments of the creeks and rivers.

General Geology

The lithological units indicated on the map face are listed in Table 1 in order of decreasing age. All consolidated rocks belong to the Archean, Proterozoic, and Archean to Proterozoic. These are blanketed by unconsolidated sediments of Pleistocene to Recent age. Figure 2 shows the generalized geology and a geological section of the map-area.

The metavolcanics and metasediments of Archean age occur in two separate domains: the predominantly metavolcanic Abitibi Subprovince in the southern three-quarters of the map-area, and the predominantly metasedimentary Quetico Subprovince in the north-eastern quarter of the region.

Wawa Subprovince

Stratigraphy in this part of the Abitibi Subprovince consists of two volcanic cycles occurring above and below a composite sulphide-facies ironstone marker unit exposed along Highway 17 between Walker Lake and the northwestern end of the Terrace Bay Batholith (Figure 2). Rocks below the ironstone unit in the central part of the area comprise, in order of abundance, an interlayered sequence of subaqueous pillowed mafic flows, pillowed andesitic flows and less abundant massive aphanitic rhyolite. This sequence exceeds about 2000 m in thickness, is overlain by about 242 m of felsic tuff and lapilli-tuff and is succeeded by about 120 m feet of the sulphide facies ironstone. Along strike, east of the Fourth Lake Fault, an abrupt facies change occurs as all the rocks exposed there, below the ironstone unit, consist almost entirely of fine-grained, massive, structureless, calcalkalic intermediate pyroclastic rocks exceeding about 3.9 km in thickness. This lower metavolcanic unit occurs along the southern margin of the central part of the map-area southwest of Schreiber. The ironstone unit, which is regarded by the author as the top of the lower volcanic cycle, is about 140 m thick, and comprises interlayered wacke, mafic tuff and pyrite-chert-graphitic shale ironstone. Above this composite ironstone marker horizon is a sequence of mostly iron-rich, pillowed tholeiitic flows about 5230 m thick interlayered with thin units of clastic and chemical metasediments about 60 m thick, and andesitic and rhyolitic units varying from about 60 m to 600 m thick. The ironstone marker horizon was not located in the northern part of the map-area. Local younging indicators in the upper metavolcanic flows, the trend of the interflow metasediments, and the southeasterly trend of the lower metavolcanic series, indicate that the supracrustal rocks are folded about east-southeasterly plunging axes. The lower metavolcanic series is homoclinal and together with the lower part of the overlying series youngs toward the northeast. This sequence forms the southern limb of a major synclinal axis located near Longworth and Big Bruin Lakes (Fig. 2). The conjugate anticlinal axis occurs in the region of the Crossman Lake Batholith.

Metamorphic grade increases northwards. The rocks of the lower series and those on the southern limb of the syncline of the upper series have been metamorphosed to the greenschist facies of regional metamorphism. Rocks on the northern limb of the syncline and those north of these are in the amphibolite facies of regional metamorphism.

The supracrustal rocks of the Abitibi Subprovince have been intruded by plutons of gabbro of varying dimensions ranging from small irregular bodies 100 m X 100 m, to plutons exceeding 7 km by 2 km; felsic plutonic rocks the largest occurrences of which are the Crossman Lake, the Whitesand Lake and the Terrace Bay Batholiths; and diabase dikes. The gabbroic rocks are generally elongated parallel to the strike of the supracrustal rocks. The Terrace Bay Batholith trends northeasterly, diagonal to the strike of these rocks.

The rocks of the Abitibi Subprovince are overlain in the northeastern part of the map-area by rocks of the Quetico Subprovince described below. Both a conformable and faulted contact were seen. The conformable contact is exposed, strikes east-west and dips 60 degrees north.

Quetico Subprovince

The rocks of the Quetico Subprovince are predominantly sedimentary, only minor mafic metavolcanic intercalations occur at the boundary zone with rocks of the Abitibi Subprovince. The metasediments are graded wackes and subordinate arenites, metamorphosed to amphibolite facies and partially migmatized.

In rare cases relict bedding could be seen, but unequivocal top directions could not be determined. Bedding is parallel to foliation and the attitudes of the foliation indicate that the rocks are tightly folded about east-west axes.

On the basis of facing determinations of the Abitibi Subprovince metavolcanics, Quetico Subprovince metasediments structurally overlie the metavolcanic rocks of the Abitibi Subprovince. At the western part of the northeastern quarter of the map area, at a locality 1.8 km south of Southpine Lake, the contact of the Quetico and Abitibi Subprovinces is exposed at a small unnamed lake. It is undeformed and structurally conformable. Away from this outcrop it is marked by a lineament trending 90°, clearly discernible on the aerial photographs used, and is occupied by a seasonal outlet creek. The rocks immediately below and south of the contact, and forming the Abitibi Subprovince, comprise foliated amphibolite and basalt. The strike of the foliation is 90°-95° and the dip 50° to the north. The overlying rocks above and north of the contact, and forming the Quetico Subprovince, comprise garnetiferous arenite with narrow 2 cm bands of interlayered amphibolite. Forty metres to the north wacke is exposed. The strike of the foliation in the sediments is 90°, and the dip is 50°-70° to the north. In the area to the south-southeast of Stingray Lake, considerable deformation was observed near the contact; it is also marked by a photo-lineament. The author interprets the boundary here to be a fault.

Metamorphosed mafic intrusive rocks are gabbro and a single serpentinite unit located at the southeastern end of Big Bruin Lake. Gabbros intrude the metavolcanic rocks in many places throughout the area, but the largest masses occur northeast of Schreiber. Based on contact relations the gabbros are younger than the mafic metavolcanics. As the gabbros are metamorphosed, they were intruded prior to the major deformation in the map area. Primary textures and mineralogy are locally preserved. The rocks, though metamorphosed, are not greatly deformed.

Felsic rocks intrude supracrustal rocks of the Abitibi and Quetico Subprovinces and occur as four batholithic masses: a) the Aguasabon Lake Batholith in the northeastern corner of the map area; b) the Crossman Lake Batholith in the central part of the region; c) the Whitesand Lake Batholith in the western part; and d) the Terrace Bay Batholith in the southeast.

The Aguasabon Lake Batholith which consists of quartz monzonite containing retrograde chlorite, may be catazonal because it shows foliation locally, and is association with migmatites and the amphibolite facies of regional metamorphism (Buddington 1959, p. 714, Badgley 1965, p. 335, 338). A contact metamorphic aureole is absent.

The Crossman Lake Batholith which consists of pink hornblende-biotite quartz monzonite, retrograde chlorite-bearing granite, grey biotite tonalite and biotite granodiorite may be later than the the Aguasabon Lake Batholith because it is massive, whereas the latter is foliated. It is believed by the author to be mesozonal based on Buddington's (1959) criteria of depth zoning and lack of a contact aureole. The Whitesand Lake Batholith consists of mostly massive pink biotite-chlorite alkali-feldspar granite with lesser porphyritic biotite granite and grey hornblende-biotite monzodiorite to biotite-hornblende quartz monzonite with minor aplite. This body, based on the criteria listed above is also mesozonal. The Whitesand and Crossman Lakes Batholiths are believed to be of the same age and are separated by a narrow septum of supracrustal rocks.

The Terrace Bay Batholith is massive, pink biotite-hornblende granodiorite to biotite alkali-feldspar granite with lesser hornblende-biotite quartz diorite to hornblende-biotite quartz monzonite. The body may be mesozonal based upon its massive texture and the pyroxene hornfels aureole imprinted on adjacent supracrustal rocks.

The Proterozoic rocks in the map area occur as discontinuous erosional remnants along the shore of Lake Superior and comprise conglomerate, chert iron oxide - iron sulphide ironstone, shale, mudstone and limestone of the lower Gunflint Formation (Moorhouse 1956, 1960; Goodwin, 1960). The rocks dip 10-20 degrees to the southwest and lie unconformably on the Archean basement. A regolith of weathered Archean pillow lava was observed near Flat Point.

The diabase dikes of Archean to Proterozoic age range in width from about 8 m to 90 m, averaging 45 m. They comprise 4 sets trending 1) west-northwesterly to east-west; 2) northwesterly; 3) northeasterly; and 4) north-south. The dikes are particularly numerous in the southern part of map area, and extend for up to 5.5 km along strike. Their relative ages are not known. Petrographically the dikes are diabase, quartz diabase, or olivine diabase. The olivine diabase dikes follow only the west-northwesterly to east-west trend.

Diabase sills of Proterozoic age were encountered only on the shore of Lake Superior and at Flint Island. This diabase resembles the diabase and quartz diabase of the dikes. On Flint Island the diabase is intrusive into Proterozoic shale and mudstone, and the sheet of diabase on the shore to the northeast of the island is interpreted to be the northeastern extension of this sill.

Precambrian

Archean

Metavolcanics and Metasediments

Metavolcanics

Geochemical Classification of Metavolcanic Rocks

Before classifying these rocks by major element geochemistry they were tested for alteration by the method of Beswick and Soucie (1978) to determine whether their classification on the Irvine and Baragar (1971), Miyashiro (1974), and Jensen (1976) diagrams was reliable.

The method of Beswick and Soucie (1978) was based on the demonstration by Tuominen (1964) that fractionated igneous sequences show logarithmic variations of the molecular proportions of major oxide constituents, and satisfactory genetic interpretations of igneous rocks are possible using ratios of molecular proportions of oxides (Pearce 1968; 1970). Rollinson and Roberts (1986), however, suggest that extreme caution should be excercised when interpreting these diagrams. In their method Beswick and Soucie derived two sets of logarithmic molecular proportion ratio (LMPR) plots of major oxides: each set using the same major oxides SiO_2, Al_2O_3, CaO, and Fm (FeO + MgO + MnO) but with one set having each major oxide ratioed against K_2O, the other set ratioed against Na_2O. The control data for the plots were based on unaltered tholeiitic, calcalkalic and alkalic Phanerozoic volcanic rocks. The plots are of the general form log (X/Y) versus log (Z/Y) where Y represents Na2O or K2O. Fig. 3 inset shows the effect of alteration (expressed as component mobility) on the plotted position of a given unaltered rock composition. The effect of alteration on the Y component is less easily seen where the trend of the control graphs is parallel to the Y direction. To calibrate the system Beswick and Soucie produced several LMPR (Logarithmic Molecular Proportion Ratio) plots of several thousand unaltered volcanic rocks. The individual points define a trend across the LMPR diagrams which then represent unaltered volcanic compositions of a variety of magma types. In Figs. 3 to 12 the trend lines are those produced by plotting the unaltered volcanic rocks of Beswick and Soucie. Altered volcanic rocks have been demonstrated to plot as points off the Beswick and Soucie trend lines.

As each plot involves three oxides, if two oxides are immobile then the amount and nature of a specific alteration can be determined. As the diagrams of Beswick and Soucie (1978) involve tholeiitic, calcalkalic and alkalic suites alteration studies of these suites are possible with the method.

Forty-three analyzed volcanic rocks from the map area were tested by the above method. The resulting plots are shown on Figs. 3-12. The scatter of the plotted points with respect to the trends defined by Beswick and Soucie show that some of the rocks are altered and could be incorrectly classified by chemically based classification schemes. To rigorously classify rocks of this map-area, the plots are grouped into three categories in Table 2 in which a check mark indicates that the plotted ratio fell within the "unaltered" trend lines. In category I are all rocks which fall within the trend lines on all ten diagrams. This means that none of the plotted oxides have been added or removed and therefore the chemical classification systems will reliably classify the rocks. In category II are rocks that have had either soda or potash enrichment or depletion: subcategory IIa implies soda alteration only, since all the plotted points fall within the "unaltered" trend lines of diagrams involving potash; category IIb similarly implies potash alteration only since all the plotted points fall within the "unaltered" trend lines of all diagrams utilizing soda. Rocks in category II may not be correctly classified by the scheme of Irvine and Baragar (1971). Rocks in category III are those which are more complexly altered involving several oxides and for which the full procedure of Beswick and Soucie (1978) will have to be followed to determine what corrections to the major element geochemistry are necessary to obtain a correct classification of the rocks by the Irvine and Baragar (1971) methods. The unaltered volcanic rocks are representative of the map area volcanic units, therefore the author believes the classification used in the map legend is correct.

In the specific cases of the rocks tested and shown in category IIa, Table 2, sample PP 22-4 was affected by soda depletion and sample RR 7-102 soda enrichment. In category

IIb, Table 2, samples RR 10-100, MM 17-3, N 13-2, were affected by potash enrichment, and samples QQ 15-21, MM 24-1, SS 4-39a, QQ 14-102, QQ 15-19, PP 22-1a and PP 16-19 were affected by potash depletion. Because of this the rocks can be better classified on the Jensen (1976) diagram, and in order to have a consistent classification using one system, all fifteen rocks were plotted on the Jensen cation plot (Fig. 12). The names derived are used in Tables 3-6 and on the map face and legend. The LMPR plots show that except for TiO2, which is not considered in such plots, the parameters on which the Jensen plot is based have not been altered. Also, none of the parameters of the Miyashiro (1974) classification have been altered. In all three classifications mentioned the uppermost two rocks of Table 2 are classed as tholeiitic basalts. These uppermost fifteen rocks of Table 2 were used as a reference in the final classification of the unanalyzed rocks.

The rocks other than the uppermost fifteen rocks of Table 2 have not been plotted for classification or listed in Tables 3-6, because alteration of their major oxides would preclude their correct naming. Because the felsic rocks analyzed and tested on Figures 3-12 were too altered for reliable classification, they are coded on the map face and in the legend under the heading of tholeiitic and calcalkalic rocks without distinction.

The mafic metavolcanics in categories I and II have been plotted on Figure 13 and are all from the upper stratigraphic sequence. One sample from the lower stratigraphic sequence QQ 13-11 which was classified as a tholeiitic basalt in the Irvine and Baragar (1971), Jensen (1976), and Miyashiro (1974) classifications is also plotted. Although a clear trend is not visible there is the suggestion that mafic metavolcanics in the lower sequence are more iron-rich, and rocks in the upper sequence are less iron-rich and more alumina-rich.

A total of 78 volcanic rocks from the map-area were chemically analyzed, including the 23 analyses listed in Tables 3, 5 and 7. The chemical analyses of all these volcanic rocks are listed in Appendix I.

Tholeiitic Suite

Basalt and Andesite

Rocks of this suite form about 85% of the metavolcanic rocks underlying the map-area. They are massive or schistose, with colour index about 40 or greater. They are black or black-green on the fresh surface and greenish-grey on the weathered surface and mineral assemblages of greenschist facies, amphibolite facies, and pyroxene-hornfels facies are present. Those rocks within the greenschist facies are either massive or foliated and are aphanitic to medium-grained, whereas those belonging to the amphibolite facies are medium-grained and well foliated. Within the aureole of the Terrace Bay Batholith rocks of the pyroxene hornfels facies of local (contact) metamorphism occur.

These rocks occur in both the lower and upper metavolcanic sequences interlayered with calcalkalic rocks and metasediments. The lower volcanic sequence, southwest of Schreiber, contains tholeiitic units ranging from 40 m to 700 m thick and up to 5 km in lateral extent. The overall thickness of tholeiitic rocks within the lower sequence exceeds 2000 m.

The base of this sequence is not exposed. The thickness of individual flows could not be measured except at Schreiber Beach where pillowed flows are 30 m thick. In the upper sequence, north of Schreiber, tholeiitic basalts and andesites comprise about 90% of the volcanic rocks and occur throughout the sequence. The thickness of tholeiite sequence exceeds 10,000 m but the upper limit of the sequence is not exposed.

The tholeiitic rocks comprise massive and pillowed flows, porphyritic, amygdaloidal and variolitic flows. Plagioclase porphyritic flows occur in the middle part of the upper sequence.

Fifteen samples of rocks mapped as mafic in the field and taken from the upper and lower sequences were chemically analyzed and are listed in columns 1-15 in Table 3. Their molecular norms are listed in columns 1-15 in Table 4. Twelve of these rocks were tested for chemical alteration as described in the section on geochemical classification of the metavolcanic rocks on p--. and those with acceptably low alteration (categories I and II Table 2) are classified as tholeiitic basalts and andesites. In the Jensen diagram all the basalts are iron-rich except number QQ 15-19 of column 9 Table 3 which is magnesium-rich. In addition one of these rocks (QQ 13-11) which was not tested on the LMPR diagrams was also plotted on Figure 13 where it plots in the iron-rich part of the tholeiitic field.

Greenschist Facies Rocks

Greenschist facies tholeiites are massive or foliated, fine-to medium-grained. They include all the metavolcanic rocks of the area except those located within about 1.6 km of the Quetico-Abitibi subprovincial boundary where amphibolites and garnet amphibolites occur.

Flows

Aphanitic and fine-grained massive flows are the most common units of tholeiite in both the lower and upper sequences. They underlie and grade upwards into the pillowed facies of flows as seen along the shore of Lake Superior at Collingwood Bay south-west of Schreiber and across Highway 17 about 1.5 km southeast of Schreiber. In thin section they show relict microlitic (Photo 1:MM 17-3) and intergranular (Photo 2 QQ 13-20) texture in most cases. In such cases disoriented and partially oriented microlites of altered plagioclase 0.06-0.20 mm long and 0.03 mm wide are surrounded by a felted mass of granoblastic actinolite and in some cases chlorite. The feldspars are usually too altered for optical determination of composition owing to sericitization, saussuritization and wavy extinction. In one case in which a measurement was possible the plagioclase was albite.

Many of the plagioclase microlites show forked ends indicating incipient crystallization resulting from rapid cooling of these rocks possibly by the surrounding seawater (Bryan 1972, Gelinas and Brooks 1974) and simple or multiple twinning. In some samples feldspar is lacking altogether, and the rocks then consist of metamorphic amphibole and chlorite. In one such rock, the actinolite occurs as laths or in sheaflike or radiating clusters about 1.7 mm long by 0.4 mm wide surrounded by chlorite. It is pleochroic from pale yellow to blue. Where occurring as laths, the actinolite is subhedral. Chlorite occurs as irregular aggregates surrounding the amphibole. Quartz occurs as irregular disseminated grains, and commonly as vesicle fillings and as composite secondary grains formed from silica released from the alteration of primary pyroxene and plagioclase. Other minerals found in the rocks are epidote, biotite, carbonate and square or oblong opaque grains of magnetite, ilmenite and minor iron sulphide.

Foliated flows can also show mineral banding in thin section. In these foliated rocks the foliation is shown principally by alignment of actinolite in a lepidoblastic texture. These rocks consist of oriented grains of granoblastic pleochroic actinolite enclosing irregular discontinuous bands of altered feldspar up to 0.14 mm across at their widest part and irregular ovoid areas of composite quartz 0.28 mm long by 0.22 mm wide at their widest part.

Amygdaloidal flows are not common in the map-area, but are identical to the aphanitic mafic metavolcanic rocks described above except for the presence of the amygdules. Amygdules are restricted to the central part of map-area in the upper sequence. The amygdules are vesicles filled with secondary quartz and grey carbonate. The quartz is finely granular and the amygdules range from 1.5 mm - 3 mm in shortest dimension and 2 mm to 5 mm in their longest dimension. The carbonate-filled amygdules are generally larger and range from 3-8 mm in shortest dimension and 5 mm to 10 mm in longest dimension, and can be due to vesicles being formed at a shallower sea level.

Pillowed flows (Photo 3) have the same general appearance as the aphanitic and fine-grained rocks on both the weathered and fresh surfaces. They are more commonly observed in the southern part of the map-area, where the rocks are less deformed than else where. Excellent examples of undeformed pillowed mafic tholeiites are seen along the northern shore of Collingwood Bay in the southeastern part of the map-area. Here the flow thicknesses are about 30 m. Good examples can also be seen along the northern side of Highway 17 between 2.0 and 3.5 km east of Schreiber. In this latter area deformation makes it difficult to use the pillows for determination of facing direction. The pillows are predominantly of loaf shape and their length varies from 15 cm to 1 m and the width from 15 cm to 46 cm. Selvages in most pillows are 1 cm to 5 cm thick and show a darker weathering colour than the interior of the pillows. At Collingwood Bay the space between the pillows is filled with jasper and fragmental chloritic and epidotic material interpreted to represent altered hyaloclastite derived from the fractured glassy rims of the pillows. In the other areas interflow material is absent, the flows being in close contact with each other. In the central part of the map-area pillows with amygdules and vesicles comprising about 15% of the rims were observed. In the western part of the area the pillow rims are foliated.

Porphyritic mafic flows are uncommon in the map-area but where present contain dark grey or greyish-white plagioclase phenocrysts up to 5 X 2.5 mm. The matrix of the flows ranges from fine- to medium-grained. The phenocrysts measure 2 mm X 1.5 mm in one example and from 1.5 X 1 mm to 5 mm X 2.5 mm in another. In the latter case the rock is a coarser-grained part of a flow.

Coarse-grained mafic volcanic rock was occasionally observed associated with the aphanitic and fine-grained material of the flows. The grain size is about 1-1.5 mm, relatively coarse for mafic flows in this map area. The lack of lateral extent, 3-6 m width, gradational contact with fine-grained material, lack of intrusive relationships, and the narrow discontinuous character of the masses lead the author to consider these units as coarser-grained facies of the flows.

Carbonatized flows which are coded separately on the map face, are massive fine-grained, aphanitic and light greenish-grey or pale yellowish on the fresh surface and brownish on weathered surface. This alteration forms irregular areas about 1 m by 10 m and may be adjacent to or unrelated to a shear zone. Such altered material occurs 200 m east of the southern end of Hollinger Lake and at points 100 m and 200 m east of the south end of Von Lake in the general vicinity of the McKenna-McCann mineralized area in the south-central part of the map-area; at a point 1.7 km east of Von Lake in an unmineralized area, and intermittently over an area 1.5 km by 1.5 km located about 2.5 km east of the southern part of Ellis Lake in the central part of the map-area.

Autoclastic Rocks

Autoclastic flow breccias (Dimroth 1977, Lajoie 1981) occur in three places in the map area: in an area 1 km east of Sammy's Lake in the west-central part of the map area on a trail leading eastwards off the Zenith Mine Road; in an area on the eastern shore of an unnamed lake 0.5 km southwest of Victoria Lake near the central part of the map area; and in a region centred 1.2 km east of Sand Lake (local name) near the central part of the eastern boundary of the map area. In the first area mentioned the rock is unbedded, consisting of angular fragments 6 mm x 5 mm of dark volcanic rock set in a black aphanitic matrix. The fragments and the matrix resemble aphanitic tholeiitic flows. In the other two areas the clasts are much coarser, are podlike in form, and measure about 15 cm x 7.5 cm. The clasts are black on the fresh surface, are amygdaloidal and lie in a foliated matrix. The amygdules consist of greyish-white carbonate material 1.5 mm x 3 mm.

Pyroclastics

Mafic to intermediate tuffs are greyish green on the weathered surface and black on the fresh surface. They occur at various horizons but most commonly in the northern part of the eastern half of the map-area in the contact area between the Quetico and Abitibi Subprovinces and in the area east of the southern end of Aguasabon Lake. Most commonly the rocks are characterized by a faint colour banding from black to grey and show graded bedding with a grain gradation from coarser in the darker part of the band to finer in the lighter part. In thin section these rocks consist of granoblastic actinolite in grains showing ragged terminations and altered untwinned feldspar. The bands are 10-12 mm thick. In some examples the rocks are formed of discrete light bands and dark-green bands; the former comprising quartz and feldspar grains, the latter actinolite grains. The light and dark bands vary in thickness from 2 mm to 5 mm. The fragmental nature of the rocks is indicated by the occurrence of broken grains of crystals set in a finer-grained matrix as seen on the weathered surface. The mineralogical variation in composition of the different bands is considered by the author to be due to metamorphic differentiation. The absence of lithic fragments indicates that these rocks are crystal tuffs. Their spatial association with pillowed lavas in the area west of Graphite Lake (local name) suggests that they are subaqueous tuffs.

A particularly well exposed example of these rocks occurs along Highway 17 immediately southeast of Schreiber in the ironstone marker unit at the top of the lower cycle in that area. This unit consists of graded bedded units 1 cm to 3 cm thick and show the A and E or A-E units of Bouma (1962). These features are well displayed on the weathered surface but on the fresh surface which is generally black, only colour banding in black and grey-green units 5 mm thick can be observed. In the beds showing subdivisions A and E only the A subdivision varies from 4-15 mm and the E subdivision from 2-4 mm. Dark subrounded red garnets 1.5 mm across can be seen scattered on the weathered surface across both the arenaceous and pelitic units. In some parts of the unit grey-green lenses of mafic material up to 46 cm long can be seen, and in other places zones of convolute laminations (Photo 4) can be observed which represent the C division of the A-E sequence of Bouma (1962). These convolute zones are not always in the locations expected in the A-E sequences and may be due to soft sediment deformation as the layers above and below them are undisturbed and unfoliated. Other primary sedimentary features such as flame structures (Photo 5) and load-casting (Photo 6) can be seen. A thin section of the bedded unit showed granoblastic hornfelsic texture in both the graded part and the dark laminated part. The rock (QQ14-104) consists of a granoblastic aggregate of pale green actinolite surrounded by clinozoisite and feldspar. In some layers the actinolite is in sheaf-like and radiating form. The darker layers have a higher proportion of opaque minerals and actinolite. The lighter coloured layers have a higher proportion of feldspar. The chemical analysis of the rock is given in column 16 of Table 3 and the molecular catanorm in column 16 of Table 4. In the classification of Irvine and Baragar (1971) the rock is a tholeiitic basalt. Because of the mineral and chemical composition of the unit and its sedimentary structures, the unit is believed by the author to be a distal subaqueous mafic pyroclastic flow (Dimroth 1977). Greenschist facies metamorphism has destroyed any primary vitroclastic texture.

Amphibolite Facies Rocks

Rocks in this facies comprise amphibolites and garnet amphibolites.

Amphibolites

The amphibolites are fine-to medium-grained foliated rocks, black on the fresh surface and dark-grey to rusty brown on the weathered surface. On the weathered surfaces of the coarser-grained foliated rocks the feldspars weather as greyish-white streaky lenses which emphasize the foliation. These amphibolites are usually coarser in grain than the foliated greenschist facies rocks and are best developed in the northern part of the eastern half of the map-area within about

1.6 km of the Quetico-Abitibi subprovincial boundary; in the northwestern part of the map-area west of Upper and Lower Ross Lakes; and north of Sox Lake. In thin section these rocks show lepidoblastic texture, the foliation is defined by the hornblende. The hornblende grains vary in length from 0.4 mm to .9 mm and in width from 0.1 to 0.4 mm and are pleochroic from pale yellow to dark green. The plagioclase grains are less elongated and vary in width from 0.1 mm to 0.20 mm and in length from 0.3 mm to 0.4 mm. These grains are most commonly untwinned but twinned grains are present in two rocks (MM6-10a, 6-24) which are listed in columns 13 and 14 of Table 3. Composition ranges from (An40 to An 47) in these two rocks. Other minerals present are magnetite, ilmenite and quartz.

Chemical analyses of two of these rocks (MM6-10a, MM16-24) are given in columns 13 and 14 of Table 3, and their molecular norms in columns 13 and 14 of Table 4. They are tholeiitic basalts in the chemical classification of both Irvine and Baragar (1971) and Jensen (1976) and have been plotted on Figure 13 where they plot in the iron-rich and magnesium-rich parts of the tholeiitic field respectively.

Garnet Amphibolite

The garnet amphibolites are similar in appearance to those amphibolites described above except that pink garnets up to 9 X 9 mm can be seen, especially on the weathered surface. They are commonly strung out along the foliation. In thin section the rock is foliated and comprises green hornblende pleochroic in shades of blue and yellow green, microcline-perthite in granoblastic grains, plagioclase, pale brownish granoblastic-poikiloblastic garnet enclosing grains of quartz, titanite, epidote, and minor brown biotite.

Contact Metamorphic Rocks

Pyroxene-hornfels Facies Rocks

Pyroxene-hornfels

Although a systematic study was not made of the contact effects of the batholiths on the volcanic rocks, a sample of pyroxene hornfels was taken within 30 metres of the Terrace Bay Batholith on the southwest corner of Hays Lake. The specimen is a fine-grained, grey, massive, granular rock. In thin section it consists of a granoblastic mosaic (Photo 7) of quartz, plagioclase (labradorite An 63) clinopyroxene, hypersthene, retrograde hornblende after clinopyroxene pleochroic from olive-green to pale yellow, and rectangular opaque grains. The rock is thus in the pyroxene-hornfels facies (Turner 1980, p. 205) of contact metamorphism. The sample shows that a high grade of contact metamorphism was induced by the Terrace Bay Batholith and was later than the regional metamorphism as the regional foliation in the mafic volcanic rocks was locally obliterated here. On the basis of the total obliteration of foliated textures and the development of granoblastic textures the contact metamorphic aureole is about 200 m wide as observed at the southwestern part of the batholith.

Calcalkalic Suite

Andesite and Dacite

These rocks are grey to dark-grey on the fresh surface and light-grey on the weathered surface, and are best developed in the eastern half of the Schreiber Peninsula south and southeast of Schreiber. The colour index range of these rocks is about 5 to 25. Similar rocks occur interlayered with the tholeiitic basalts and andesites in other parts of the map-area mainly northwest of Lyne Lake in the western part of the map-area and northeast of Ducell Lake in the east-central part of the map-area. They are much less voluminous than the tholeiitic rocks. They have greenschist facies assemblages.

In the lower sequence the rocks occur as units varying from about 60 m thick southwest of Schreiber to a sequence exceeding 3 km thick southeast of Schreiber. This latter sequence consists almost entirely of aphanitic structureless rocks, and is not interlayered with mafic units. It stands in marked contrast with the calcalkalic rocks to the west, west of Fourth Lake Fault in the Schreiber peninsula. This unit is fault-bounded on both its east and western sides. Southwest of Schreiber the calcalkalic rocks extend laterally for about 1.5 km in outcrop.

Eighteen rock samples of colour index less than about 30 and taken from both the lower and upper sequences were chemically analyzed and tested according to the method described in the section on geochemistry of the metavolcanic rocks p.--. They are listed in Table 2 where they are described as intermediate or felsic volcanics. The chemical analyses of three of these rocks which fall into category II of Table 2 (numbers 13, 14, and 40) are listed in columns 1-3 of Table 5. Their molecular norms are listed in Table 6 columns 1-3. These rocks are calcalkalic in the Jensen (1976) classification.

Greenschist Facies Rocks

Flows

Massive, aphanitic to fine-grained andesitic and dacitic rocks are believed to be flows because of the absence of fragmental textures seen on outcrops, and the occurrence of igneous textures such as porphyritic microgranular (Photo 8, QQ 10-6) and porphyritic-pilotaxitic (Photo 9, QQ 14-15) textures seen in thin sections. Because samples for microscopic examination were not taken at all such outcrops some units shown on the map face as 2a will include both flows and fine-grained tuffs. No flow structures were observed on any of the outcrops studied.

Megascopically aphyric rocks in thin sections show feldspar phenocrysts. These and the microlitic feldspars are completely sericitized. The shapes of the feldspar pseudomorphs are suggestive of plagioclase. The ferromagnesian phenocrysts are converted to aggregates of chlorite, brown biotite and opaque grains. Where recrystallization has been more pronounced, green pleochroic actinolite needles have developed in the matrix. The feldspar phenocrysts in the porphyritic-felsitic rocks vary from 0.15-0.27 mm wide and average 0.45 mm long. In the porphyritic-pilotaxitic rock the feldspar phenocrysts range in width from 0.21-0.48 mm and in length from 1.02 mm to 2.10 mm. The microlites average 0.06 mm wide by 0.24 mm long.

Megascopically porphyritic rocks are light grey to dark grey on the fresh surface and light grey and buff on the weathered surface. These rocks show phenocrysts of vitreous quartz ranging from 1 mm X 2 mm to 4 mm X 5 mm, pink or grey feldspar ranging from 1 mm X 1 mm to 4 mm X 6 mm, and hornblende 1 mm X 1 mm in size. In thin section the textures of these rocks are porphyritic-pilotaxitic (Photo 10, QQ 13-8), porphyritic-micro-felsitic (Photo 11, SS 4 - 28) and porphyritic-microgranular (Photo 12, NN 16-12) with the matrix showing varying degrees of recrystallization. The phenocrysts consist of irregular, subhedral and euhedral quartz, dusty brownish euhedral, subhedral grains and irregular areas of plagioclase which are sericitized, saussuritized and may contain irregular areas of pale green chlorite and carbonate, and euhedral, subhedral and irregular clotty areas of ferromagnesian minerals now consisting of green pleochroic actinolite. Some of these ferromagnesian grains show ragged terminations and represent recrystallized mafic grains. The shapes of many of the grains suggest that the original minerals were hornblende, and a pyroxene in one case. Clots of diversely oriented grains of brown biotite also occur. The matrix consists of quartz and altered plagioclase feldspar or mostly plagioclase feldspar associated with radiating acicular actinolite, chlorite, grains of brown biotite, dusty epidote and carbonate. Opaque grains are scattered through some of the matrices of the rocks.

The chemical analyses of three of these rocks (SS 4 - 39a, QQ 14-102, and RR 7-102) are given in Table 5 columns 1, 2 and 3. Their standard catanorms are in columns 1, 2 and 3 of Table 6. Reference to the plots of these analyses on LMPR diagrams Fig. 3 to 12 and their listing in Table 2 shows that samples SS 4 - 39a and QQ 14 - 102, category II b, were affected by potash depletion, whereas sample RR 7 - 102, category II a, was affected by soda enrichment. The first two are classed as calcalkalic dacites, the last as a calcalkalic basalt in the classification of Irvine and Baragar (1971).

Amygdaloidal felsic rocks are not very common in the map-area. They are similar in appearance and weathering characteristics to the megascopically aphanitic and fine-grained rocks but they contain amygdules of white carbonate, ovoid in shape and measuring up to 8 mm X 4 mm. In thin section the amygdules consist of mosaic quartz and carbonate.

Pyroclastics

Tuffs are light grey, fine-grained to aphanitic rocks on the fresh surface, but their grey weathered surfaces show a fine granular texture in which small grains of feldspar crystals about .25 mm across can be seen. The rocks are best developed in the east-central part of the map-area 1.5-2.0 km northeast of Ducell Lake and 1 km northeast of Sand Lake located 5 km east of Ducell Lake. No bedding could be observed in these rocks and graded bedding is absent. In the two areas mentioned these rocks occur as units about 300 m to 800 m thick but they also occur as thinner units, 20 m to 60 m, interlayered with the mafic flows. The rock type is probably a pyroclastic fall-back tuff (Dimroth 1977) based on the absence of bedding and the poor sorting of the material. A thin section shows a recrystallized granoblastic aggregate of quartz and untwinned dusty brownish plagioclase feldspar some of which is sericitized. Granoblastic grains of green chlorite, brown biotite, colourless muscovite, carbonate, epidote and titanite are present. Rectangular and irregular grains of opaque minerals comprising hematite and ilmenite altered to titanite peripherally occur. Owing to thorough recrystallization of the rock primary tuffaceous texture is not evident.

Lapilli tuffs are not common in the map-area. They are grey or pink rocks on the fresh and weathered surfaces with a colour index of 20. The grey rocks show subangular and subrounded lithic fragments ranging predominantly from 6 X 3 mm to 8 X 4 mm in a matrix of fragments predominantly 1.0 by 1.5 mm. Occasional large subrounded fragments 5 X 2 cm occur in the rocks, or rectangular aphanitic fragments 4 X 1 cm. The rocks occur interlayered with the mafic metavolcanics at various horizons in both the lower and upper volcanic sequences; west of Schreiber in the lower sequence and in the eastern half of the upper volcanic sequence. These lapilli tuff units vary in thickness from 60 m to 80 m and are up to 100 m in lateral extent. The absence of bedding structures in these rocks suggests that they are pyroclastic fall-back tuffs.

Tuff breccias also are not very abundant in the map-area. One example found in the southwestern part of the map-area 4 km west-southwest of Schreiber is associated with lapilli tuffs. The rock consists of angular, subangular and rounded lithic fragments of aphanitic grey and greenish-grey volcanic clasts varying from 25 by 10 mm to about 90 X 55 mm in an unsorted greenish-black granular aphanitic, fine-grained matrix. The unit is about 40 m thick and about 80 m in lateral extent and forms the base of a tuff breccia-lapilli tuff unit which grades upwards into aphanitic volcanic rocks. The presence of grading in this unit suggests that it may be a pyroclastic flow or fall-out unit (Dimroth 1977).

Tholeiitic and Calcalkalic Suite

Felsic Metavolcanics

These rocks form only about 2 percent of the rocks in the map area. They occur interlayered with the tholeiitic and calcalkalic rocks in both the lower and upper sequences and are exposed in the south-western, central and east-central parts of the region. They comprise flows and pyroclastic rocks. Their modal colour index varies from 0-5 in most cases but rocks judged to have a colour index up to 15 were also classed as felsic. Five of those rocks chemically analyzed were tested according to the method described in the section Geochemistry of the metavolcanic rocks p. --. Samples are listed in Table 2 as felsic volcanics (numbers 32, 33, 34, 35, and 43), and fall into category III of that table.

The chemical analyses of these felsic metavolcanics are listed in columns 1-4 of Table 7 and their molecular norms in columns 1-4 of Table 8. These rocks have been classed variously as calcalkalic or tholeiitic in the classifications of Irvine and Baragar (1971) and Jensen (1976) and as andesites, dacites or rhyolites. These results are regarded by the writer as due to alteration. They are therefore grouped here and coded as tholeiitic or calcalkalic on the map face. In any case it was not possible on field characteristics to distinguish tholeiitic or calcalkalic felsic volcanics.

Greenschist Facies Rocks

Flows

Megascopically massive aphanitic rocks are grey and greyish white on the fresh surface and white on the weathered surface. They form units varying in width from 40 m to 200 m. Fragmental textures and bedding were not seen on the weathered surface of outcrops of these rocks and in the absence of such features the rocks are regarded as flows. Clastic texture was also not observed in thin section of these rocks.

Porphyritic flows are much more common in the map-area than the megascopically aphanitic flows. The flows are commonly massive or rarely foliated. In both cases the rocks are greyish-white to dark-grey on the fresh surfaces and grey to buff on the weathered surfaces. On the weathered surface phenocrysts of quartz and grey feldspar can be seen both of which vary from about 1 to 1.5 mm across. In thin section these rocks show euhedral and subhedral grains of quartz some of which are fractured and all show wavy extinction. These quartz grains also show mosaic structure due to recrystallization. The feldspar phenocrysts are euhedral and subhedral and are very fresh to dusty brownish in colour due to alteration to saussurite. Most are plagioclase (An 6-9) showing Carlsbad and albite twinning. Minor potassic feldspar also occurs. Feldspar phenocrysts are absent in some of the rocks. The matrix of all the rocks is a microgranular granoblastic aggregate of quartz and feldspar. In two of the rocks studied the matrix has a variable grain size. Scattered through the matrix are lath-shaped muscovite, some of which is xenoblastic; epidote as irregular dusty grains; carbonate as irregular areas and patches; chlorite as green streaks, flakes and irregular patches; brownish-green grains of biotite with ragged ends; and opaque grains of hematite and ilmenite, altered to titanite. Where these rocks are foliated the foliation in the matrix is marked by streaks of parallel elongated and lensoid grains of pale greenish chlorite.

Pyroclastics

Tuffs are greyish-white on the weathered surface and grey on the fresh surface. The fragmental nature of these rocks is best detected on the weathered surface where broken grains of quartz and feldspar 1-1.5 mm across are set in an aphanitic matrix. The feldspar grains are greyish-white in colour and show diffuse boundaries owing to recrystallization. Bedding or graded bedding are both absent in these rocks. However irregular dark green streaks can be seen in some of these rocks and may represent altered pumice.

Lapilli-tuffs are greyish-white on the weathered surface and grey on the fresh surface. They consist of angular grey and cream aphanitic fragments varying from 4 X 1.5 mm to 24 X 14 mm. The clasts are matrix-supported.

Tuff-breccia was observed in the southwestern part of the area about 1.6 km southeast of Whitesand Lake. The rock consists of leucocratic fragments of rounded lithic volcanic rock fragments up to 25 cm across set in an intermediate lapilli-sized tuff matrix. The rock is matrix-supported. The large fragments are composed of vesicular rhyolitic rocks. The thickness of the exposed unit is about 60 m and it is about 100 m in extent.

Metasediments

Metasediments occur in two situations within the map area: as interflow units within the metavolcanic rocks of the Abitibi Subprovince and as major metasedimentary units in the Quetico Subprovince occurring in the northeast part of the map-area. The rocks are described under these two groupings.

Abitibi Subprovince

Greenschist Facies Rocks

Argillite occurs as a black aphanitic rock forming part of the composite sedimentary marker unit between the lower and upper cycles located 2.5 km southeast of Schreiber where it is associated with chert, graphitic shale, pyrite and pyrrhotite. The rock is firmly indurated and cannot be scratched with a knife. It appears to have been silicified subsequent to its formation. This is suggested by the presence of chert associated with the rock. Banding cannot be seen in the rock in hand specimen but in thin section it shows dark carbonaceous laminae 2-3 mm wide alternating with light-coloured lenses 0.28-1.12 mm wide at their thickest part. Both laminae and lenses contained angular, wedge-shaped mud chips and subrounded equant grains of clouded plagioclase feldspar and minor quartz. The grains in light-coloured lenses are larger than in the darker laminae, are mostly equant and measure 0.2 mm across. Those in the dark laminae are smaller and measure on average 0.06 mm. The rock is non-fissile and does not possess slaty cleavage.

Chert occurs as black and dark grey bands 1 m thick associated with the argillite described above and also as independent units about 7 m thick. Such chert is well exposed along the southside of the Highway 17 road cut between Schreiber and Walker Lake. A good example of such a unit occurs at the top of the hill with a microwave tower about 3/4 km northeast of the highway at Schreiber. This unit is interlayered with mafic tholeiitic metavolcanics. Graphitic shale occurs in the ironstone marker unit at the top of the lower cycle as fissile units interlayered with chert, argillite and mafic wacke in the metasedimentary unit immediately southeast of Schreiber. This shale is finely interlayered with pyrite and pyrrhotite bands up to 2-3 cm thick and forms a composite unit 120 m thick overlain by mafic flows and underlain by intermediate tuff. The weathering of the pyrite from this unit along Highway 17 immediately northwest of Schreiber accounts for the rusty brownish colour of the outcrops, and gives an exaggerated idea of the actual amount of pyrite and pyrrhotite.

Wacke occurs as narrow units varying from about 50-150 m thick interlayered with the metavolcanic rocks of both the upper and lower cycles. Owing to metamorphic effects the thickness of the individual beds are not observable although in one case, in the unit immediately southeast of Schreiber a graded garnetiferous bedded unit was mapped in which the beds range from 6 mm to 16 mm in thickness. The only primary feature observed was graded bedding. The rocks are brownish-grey on the weathered surface and dark to medium grey on the fresh surface, are medium to and fine grained and show a weak to moderately developed foliation. In thin section the rocks are recrystallized and show a fine- and medium-grained granoblastic aggregate of quartz and plagioclase and greenish and greenish-brown flakes of biotite oriented in parallel disposition imparting a foliation to the rock. Accessory minerals comprise dusty carbonate epidote, apatite, muscovite, and square, oblong and irregularly shaped opaque grains of pyrite, stringers of carbonate also occur as elongate, curved masses parallel to the foliation.

Ironstone occurs as magnetite-chert or magnetite only (oxide facies, Gross 1965) and as pyrite - pyrrhotite - chert (sulphide facies, Gross 1965). They form thinly bedded interflow units interlayered with the metavolcanic rocks of the Abitibi Subprovince. They are restricted to the southern part of the map area.

The oxide facies magnetite-chert ironstone interflow units occur most abundantly between 1.5 km and 4 km northeast of Schreiber within the upper volcanic cycle. The units vary from about 5 m to 20 m thickness and some persist for distances of about 1.5 km. The are interlayered with the tholeiitic and calcalkalic metavolcanic rocks and consist of interlayered bands of grey or black chert 1-5 cm thick with black massive magnetite bands 3-20 mm thick. In some places, for example at the Hydro Electric Power Commission access road about 1.3 km southwest of Big Bruin Lake, the chert-magnetite ironstone unit is highly contorted. Analyses of grab samples taken during the field mapping and carried out by the Geoscience Laboratories, Ontario Geological Survey returned values ranging from 7.38 to 35.6 percent total iron, with one sample assaying in addition 0.05% S, 0.02% P_2O_5 and 0.35% TiO_2.

Sulphide-facies ironstone occurs as a composite unit ranging from about 40 m to 120 m thick at the top of the lower cycle in five segments due to displacement by faulting. It trends in a general southeasterly direction stretching from Walker Lake (1.5 km northwest of Schreiber) to a point 1.5 km southwest of the southwestern corner of Hays Lake. It is an interflow sedimentary unit lying between calcalkalic dacitic flows and pyroclastics below and tholeiitic flows above. The unit consists of inter-banded pyrite, pyrrhotite, black and grey chert, silicified argillite, carbonate lenses, graphitic shale and mafic graded tuff. The pyrite and pyrrhotite occur as stringers 5-10 mm thick, or as bands as much as 15 cm thick or globules 2.5 to 5 cm in diameter; or as 2 mm thick disseminations in the argillite shale and mafic wacke. Limestone bands are up to 8 cm thick and can best be seen in the segment northwest of Schreiber.

Amphibolite Facies Rocks

Wacke containing garnets was encountered northeast of Lyne Lake in the western part of the map area. Sillimanite as sheaf-like and fan-shaped masses occurs in the pelitic upper part of a coarse wacke at Longworth Lake near the contact with intrusive granitic rocks. This was the only occurrence of sillimanite observed in the map area.

Quartz-feldspar schist and biotite - quartz - feldspar schist occur in the northwestern part of the area 2.5 km northwest of Sox Lake. They are derived from wacke-mudstone couplets as could be seen from the gradation in the field from one rock type to the other and from accompanying mineralogical changes. Biotite - quartz - feldspar gneiss believed also to be derived from wacke occurs as enclaves in the granitic rocks. These high-grade rocks are gneissic, mottled grey and black rocks containing flakes of biotite up to 1 mm across which define the foliation. In certain parts of these rocks porphyroblasts of grey plagioclase feldspar can be seen. Migmatitic rocks comprising biotite - quartz - plagioclase feldspar gneiss and layers of leucocratic granitic rock also occur in the contact region between amphibolite derived from mafic metavolcanics and granitic rocks. The granitic leucosome is in places gneissic.

Mineralization comprising molybdenite and chalcopyrite can be observed on the foliation planes. The derivation of the schist and gneiss from weakly foliated wacke can be seen in some outcrops in this area in the contact zone with the granite.

Quetico Subprovince

The rocks in the Quetico Subprovince comprise wacke, arenite and migmatized equivalents and they belong to the greenschist and amphibolite facies. Wacke is the predominant rock type.

Greenschist Facies Rocks

Wackes within this facies are light grey on the weathered surface and dark grey on the fresh surface. A megascopic foliation can be observed in these rocks. The rock occurs as beds 50 mm to 150 mm thick as seen in a few outcrops along the Kimberly Clark of Canada Limited road crossing the north-central margin of the map-area. In most cases, however, bedding cannot be observed due to pervasive metamorphism, but where preserved the only primary feature visible is a vague indication of graded bedding. In thin section these rocks show lepidoblastic texture with the foliation in the rock defined by micaceous minerals. Mineralogically the rocks comprise predominantly chlorite, less abundant biotite, carbonate and sericite after feldspar, quartz and altered plagioclase feldspar. The quartz shows wavy extinction. No twinning could be seen in the less altered plagioclase feldspar grains.

Arenites in this facies are pale yellowish grey on the weathered surface and pale grey on the fresh surface. The rocks are fine grained and are massive or weakly foliated, the foliation being marked by dark thin streaks of biotite and chlorite. The colour index of these rocks is about 7. Of the five specimens examined in thin section, four showed lepidoblastic texture and one was massive granoblastic. The rocks consist of granoblastic aggregates of quartz showing wavy extinction; plagioclase (An20-21) both untwinned and showing polysynthetic twinning, and fresh and altered to sericite; biotite, pleochroic from dark brown to pale-yellow; pale green chlorite with anomalous blue and mauve interference colours; and colourless muscovite, carbonate and epidote. Accessory minerals are apatite, titanite, pyrite and other opaque minerals are sparsely present.

Highly sheared and deformed, matrix-supported, oligomictic pebble conglomerate was observed at the base of the Quetico metasediments in the northeastern part of the map-area on the eastern shore of Aguasabon Lake. The elongation ratio of the clasts is 2:5:1, the clasts consisting of greyish-white porphyritic granitic rock, and grey aphanitic volcanic rocks. The size of the clasts is about 5 cm by 2 cm. The clasts are set in a sheared dark-coloured wacke matrix.

Amphibolite Facies Rocks

Most of the wackes have been metamorphosed to this rank. They are yellowish grey on the weathered surface and grey to dark grey on the fresh surface. They are medium and fine grained, massive and weakly to moderately foliated. Owing to the pervasive foliation and recrystallization it is not possible to determine the thickness of the original beds in most cases, but in a few places primary graded bedding can be seen. In one case the graded bedded unit was 2.5 cm thick indicating that the unit is very thinly bedded. In the few cases where primary bedding could be observed this was seen to be parallel to the foliation. In thin section these rocks are recrystallized showing granoblastic and lepidoblastic texture. The foliation is marked by the alignment of flaky grains of biotite and in many cases also by the rectangular form of quartz and feldspar grains. The rocks comprise quartz showing wavy extinction, plagioclase (An27-55) biotite strongly pleochroic from brown to pale yellow, garnet, and accessory apatite, zircon and opaque grains. Many of the grains of biotite show pleochroic haloes. In some of the rocks the feldspar grains are sericitized or patchily replaced by epidote and the biotite is chloritized. These represent retrograde metamorphic effects. Granoblastic hornblende, pleochroic from blue-green to yellow accompanies the biotite in some of the wackes. In the boundary region between the Quetico and Abitibi Subprovinces, rocks of wacke composition show microscopic alternating biotite-rich and hornblende-rich bands. The chemical analysis of a garnetiferous fine-grained wacke is given in column 2 of Table 9, and the norm in column 2 of Table 10. The modal plagioclase composition of the rock is An32 (andesine), indicating the amphibolite facies for the rock.

Arenites in the amphibolite facies resemble those in the greenschist facies but garnet is present. Plagioclase ranges from oligoclase-andesine to andesine (An30 - 32) and shows albite twinning, combined with pericline or acline A twinning in some grains. Biotite, muscovite and pale yellow-green chlorite occur as independent flakes and also enclosed in the garnet.

Metamorphosed Mafic and Ultramafic Intrusive Rocks

These rocks comprise metagabbro and serpentinite. The metagabbros are medium-grained, massive rocks which are black or dark green on the fresh surface and greyish green to brownish green on the weathered surface. Owing to the effects of metamorphism, the grain boundaries cannot always be observed but where they can, the grains of the ferromagnesian minerals are about 2 to 3 mm across. Plagioclase occurs only sparsely and is of regular shape as grains 1 X 1 mm, or as large irregularly shaped grains up to 10 X 8 mm. These feldspar grains are grey or pale buff in colour.

Metamorphosed Mafic Rocks

The gabbro forms irregular bodies of various sizes and shapes intrusive into the metavolcanic rocks throughout the mapped area.

Cameron Lake Gabbro

This is interpreted to be the largest body of gabbro in the map area and is believed by the author to have originally underlain the area now occupied by the Crossman Lake Batholith. Remnants of this pluton occur at Cameron Lake, in an area 2 km east of Cameron Lake, and in the west-central part of the map-area 2.5 km east of Lower Ross Lake. West of the map-area this pluton extends to within 0.5 to 1.5 km of Winston Lake (Pye 1964, Map No. 2023), and forms a northern mafic rim to the Crossman Lake Batholith. However, the Crossman Lake Batholith is clearly intrusive into the Cameron Lake gabbro and the Crossman Lake Batholith extends westward beyond the map-area (Carter, 1973). Similar gabbro is observed entirely enclosed and intruded by granitic rocks 2 km east of Lower Ross (Rhea) Lake. The Cameron Lake gabbro is identical with other gabbro masses intrusive into the metavolcanic rocks. These observations lead the author to conclude that the granitic rocks of the Crossman Lake Batholith are not differentiates of the Cameron Lake gabbro.

Four thin sections were studied from the various masses of the Cameron Lake gabbro. Three thin sections show massive granoblastic and subdiabasic textures and one shows foliated nematoblastic texture. The ferromagnesian mineral is hornblende showing blue-green to yellow pleochroism and occurs in the massive rocks as equant rectangular grains with ragged terminations and commonly is poikiloblastic with quartz inclusions. The average size of the grains is 2 mm X 3 mm. In the foliated sample, the hornblende occurs as granoblastic and poikiloblastic laths oriented parallel to the foliation. In one of the rocks which shows subophitic texture, the plagioclase is randomly oriented and partly enclosed in the amphibole to give a relict subophitic texture. Plagioclase occurs as fresh and altered subhedral or xenoblastic grains. The altered grains are dark brownish and are sericitized and saussuritized. Lamellar albite-Carlsbad, and Carlsbad twinning, combined with acline A twinning are observed in the fresh and less altered grains and the plagioclase composition ranges from An45 to An85 (andesine to bytownite). Other minerals present are epidote, chlorite, carbonate and opaque magnetite, ilmenite altered to leucoxene and hematite, and pyrite. The chemical analyses of these rocks are shown in columns 1 to 4 in Table 11, and their molecular norms are given in columns 1-4 of Table 12. The rocks are tholeiitic gabbros based on normative mineralogy.

Other Gabbro Intrusions

Five thin sections were studied from other isolated bodies of gabbro and they are all similar to each other in mineralogy and texture, but in some of the thin sections quartz showing wavy extinction occurs. The amphibole is actinolite and hornblende and the plagioclase, where fresh, ranges in composition from An40 to An67 (andesine to labradorite). A thin section from the mass southwest of Lamont Lake shows relict clinopyroxene. The relict clinopyroxene shows peripheral alteration to amphibole and helps to confirm the interpretation of these metamorphosed mafic intrusions as metagabbros. The chemical analyses of these samples are listed in columns 5-8 in Table 11 and the standard molecular catanorms in columns 5-8 of Table 12. The rocks are chemically tholeiitic.

Metamorphosed Ultramafic Rock

Ultramafic rock was found at one place only in the map-area: an outcrop forming a promontory on the southeastern shore of Big Bruin Lake in the south-central part of the map-area. Stratigraphically the unit occurs in the upper part of the upper sequence. The rock is overlain by grey bedded chert of the Abitibi metavolcanic rocks. The unit is crossed by numerous fractures varying in width from 3 mm to 10 mm which are filled with dark greyish aphanitic material (Photo 13). This fracturing imparts rectangular, crudely polygonal, pillow-like and radiating sheaf-like patterns to various parts of the outcrop. Spinifex texture is absent and the layered flow units characteristic of an ultramafic flow (Pyke 1978 Figure 2, p. 9) were not observed. Because of these considerations the rock is probably an intrusive sill rather than a flow and is therefore classed here with the Metamorphosed Intrusive Rocks.

In hand specimen the rock is fine-grained, massive, dun coloured on the weathered surface and blue-black on the fresh surface. Very faint colour banding can be observed. In thin section the rock consists of alternating colourless and pale brownish pleochroic bands traversed by narrow stringers of opaque grains parallel to the layers. The colourless bands are from 1.96 to 3.64 mm wide and consist of antigorite occurring as irregular areas with aggregate grey polarization colours, and as narrow acicular and curved grains. The pale brownish layers are 0.84 mm to 3.64 mm wide and consist of criss-crossed, raggedly terminated, narrow laths of tremolite. The opaque mineral occurs as irregular and ovoid grains having irregular edges and as stringers parallel to the layering. The grains are about 0.056 to 0.84 mm wide and are magnetite. No chromite was observed.

The chemical analysis of the rock is given in column 9 of Table 11 and its plot is shown on the Jensen (1976) diagram Fig. 13, where it plots in the ultramafic komatiite field. The chromium content of the rock is 0.4%, the nickel content 0.19%. This would indicate that chromium and nickel occurs in magnetite replacing ferric iron and ferrous iron respectively (Deer, Howie and Zussman p. 428, 1966).

Felsic Intrusive Rocks

Granitic rocks in the map-area comprise about 50% of the bedrock. They occur: (1) as batholiths intrusive into the metavolcanics of the Abitibi Subprovince which include the Crossman Lake Batholith, the Whitesand Lake Batholith, the Terrace Bay Batholith and the Gwynne Mountain Pluton; and (2) as narrow sheets and lenses in migmatite, and larger plutonitic masses, for example the Stingray Lake Pluton and the Aguasabon Lake Batholith associated with the Quetico Subprovince metasediments. Other smaller bodies are also intrusive into the supracrustal rocks but these are not specifically described.

Abitibi Subprovince Granitic Rocks

In the Abitibi (Wawa) Subprovince, within the limits of the map-area, the Crossman Lake Batholith is separated from the Whitesand Lake Batholith by a narrow septum of metavolcanic-metasedimentary rocks trending east-west in the area north and northwest of Sox Lake. West of the map-area, however, the two batholithic masses coalesce as shown on the Nipigon-Schreiber Geological Compilation Series map (Carter et al., 1973, Map 2232). The Terrace Bay Batholith is located in the south-eastern part of the map-area and is partly enclosed by metavolcanic rocks. The Gwynne Mountain Pluton is entirely enclosed in metavolcanic rocks and is fault-bounded on its eastern and western sides.

The Crossman Lake Batholith

This batholith extends across the northern part of the map-area and has a southwesterly-projecting lobe at Ellis Lake in the east-central part of the map-area. It extends beyond the map-area both east and west. The rocks are predominantly medium grained, massive and pink on both weathered and fresh surfaces. The pink variety is predominant, the grey variety is less abundant. Gneissosity is encountered only in the southwestern part of the batholith in the northwestern part of map-area. In this northwestern part of the map area the rocks are associated with migmatized metasediments. Porphyritic phases of the pink variety occur in the area east of Maude Lake along the southern margin of the batholith. Mafic minerals within the batholith comprise hornblende and biotite. The granitic rocks vary compositionally as follows: monzodiorite, tonalites granodiorites granite and alkali-feldspar granite. The pink rocks are mainly quartz-monzonite, granite and alkali-feldspar granite, the grey rocks are tonalites and granodiorites. The batholith as exposed in the map area is composed mainly of granite and alkali-feldspar granite but sampling was not sufficiently detailed to say which granitic composition predominates. Intrusive relationships between the different types of pink granitic rocks were not observed nor were they observed between the grey and the pink granitic rocks.

Thin sections of fourteen samples were examined and their modes were measured. The modes are listed in Table 13. The plagioclase is variably altered in all the rocks and measurements were made on the least altered grains. The rocks are plotted on the QAP diagram of Streckeisen (1976), Fig. 14.

Chemical analyses were made of three samples from the batholith, and their mesonorms calculated. The chemical analyses and mesonorms are listed in Tables 14 and 15 respectively.

Major Phases

Tonalite

This rock is massive, medium grained, and grey on both the weathered and fresh surfaces. In one of the samples a weak foliation is shown by the alignment of biotite grains. The feldspar grains vary from 3 X 2 mm to 5 X 2 mm, the quartz grains are somewhat elongated in some cases ranging from 6 X 2 mm to 10 X 3 mm in the foliated rock. Biotite occurs as grains

1 X 2 mm to 2 X 3 mm in size, as stringers 10 X 1.5 mm and as clots 5 X 5 mm. The texture of the rocks is hypidiomorphic granular.

The quartz (33-38%) occurs interstitially as anhedral, composite grains of variable grain size, invariably showing wavy extinction and having curved or sutured boundaries.

The alkali feldspar (2-4%) consists of anhedral interstitial grains of microcline partly wrapped round plagioclase. Some of the grains are fresh whereas others are dusty brown.

The plagioclase (46-59%) is andesine (An33-35) occurring as subhedral grains, some of which are zoned and brownish in the centre due to saussuritization, but possessing clear borders. Other grains are fresh. Twinning is present in the grains and consists of albite twinning, Carlsbad twinning and albite-acline A complex twinning.

Ferromagnesian minerals comprise biotite (5-21%) occurring as grains pleochroic from brownish-green to yellowish-green or yellow; with ragged terminations, and chlorite (after biotite) 3-17%.

Accessory minerals comprise muscovite, apatite, titanite, chlorite after biotite,, epidote and opaque grains. Epidote amounts to 2% of one of the rocks. The epidote is commonly associated with the biotite but does not appear to be an alteration product of it.

The chemical analysis and molecular mesonorms of one of these tonalites is given in column 1 of Tables 14 and 15 respectively.

Granodiorite

Two of the samples examined are granodiorite. One is grey both on the weathered and fresh surfaces and is weakly foliated, the foliation being marked by the alignment of biotite. The other is grey on the weathered surface and pinkish grey on the fresh surface, and shows very weak foliation marked by biotite grains. Both samples were taken from the northwestern part of the map-area where the foliation occurs over an area 6 km long by 2 km wide within the batholith. The rocks vary from fine to medium grained. In the fine-grained rocks the quartz and feldspar grains are 0.5-1 mm long and in the medium-grained rocks the quartz and feldspar grains vary from 2 x 4 mm to 3 x 10 mm. The biotite occurs as streaks 1 x 3 - 17 mm in dimensions.

The texture of both rocks is allotriomorphic granular, the foliation is on too large a scale to be seen in thin section.

Quartz (22-44%) occurs as irregular grains of various size, showing wavy extinction and lobate boundaries that are commonly enclosed in and scattered through the plagioclase grains.

Alkali feldspar (9-11%) comprises irregular, anhedral, interstitial grains of microcline. Some grains show wavy extinction, and grid-twinning is patchily developed in the grains. The grains show alteration only along cleavages.

Plagioclase (39-64%) comprises oligoclase (An20 - An24) as subhedral and anhedral dusty, sericitized, slightly cloudy grains. Uncommon grains of epidote and muscovite are enclosed in some plagioclase grains. In one of the samples studied (MM6-21) the plagioclase encloses grains of the accessory minerals titanite and epidote. Polysynthetic albite twinning occurs.

Biotite (5%) is the major ferromagnesian mineral which in one rock is pleochroic from dark brown to light brown, with opaque grains along the cleavage. In some cases the biotite shows minor alteration to chlorite. Pleochroic haloes occur about included opaque grains. The biotite occurs as grains with ragged terminations. In the other rock the biotite is pleochroic in shades of green-brown. Accessory minerals are muscovite, calcite, green chlorite, pale yellow epidote, brownish titanite, apatite and pyrite.

Chemical analysis and the molecular mesonorm of one of these rocks are given in columns 2 of Table 14 and 15 respectively.

Granite

Only one of the samples studied in thin section is a granite. This rock has been chemically analyzed. The sample was obtained from the Rhumly Lake area near the contact of the batholith with metavolcanic rocks in the east-central part of the map-area.

The rock is pink on the weathered and fresh surfaces, massive, medium grained with the average grain size of felsic minerals about 2 X 3 mm. The chlorite occurs in laths 1 X 6 mm and also equant grains 2 X 2 mm.

In thin section the texture of the rock is porphyritic allotriomorphic granular showing subhedral grains of plagioclase in an allotriomorphic granular matrix of quartz alkali feldspar and chlorite. The rock has been affected by brittle deformation, as shown by the granulation of the feldspar phenocrysts.

The quartz (19%) shows sutured borders, wavy extinction and occurs in composite grains. In some cases the quartz grains are streaked out.

The alkali feldspar (20%) consists of anhedral microcline confined to the matrix. It is mostly fresh, and shows grid-twinning. Some potash feldspar grains are untwinned but may be microcline.

The plagioclase (35%) forms both phenocrysts and matrix feldspar. In both the phenocrysts and the matrix the plagioclase is almost completely altered to sericite. Measurement of the unaltered part of one grain gave a composition of oligoclase (An21).

The ferromagnesian mineral is chlorite (17%) as lath-shaped and irregular grains pleochroic from green to pale yellow. The chlorite is associated with epidote and calcite and shows opaque grains parallel to the cleavage.

Other minerals comprise irregular grains of pale yellow pleochroic epidote (7%), opaque minerals (1%) and apatite and calcite in amounts less than 1%.

Alkali-Feldspar Granite

Four of the granitic rocks measured were plotted on the Streckeisen diagram (Streckeisen 1976) and classed as alkali-feldspar granites. Of these three are pink on the fresh and weathered surface and one is grey on both the weathered and fresh surface. The rocks are massive and medium grained, with quartz grains ranging from 1 X 1 mm to 3 X 5 mm, feldspar grains 2 X 3 mm to 2 X 5 mm and ferromagnesian minerals varying from 2 x 5 mm to 3 x 5 mm..

In thin sections three of the rocks show allotriomorphic to hypidiomorphic granular texture and one shows porphyritic allotriomorphic granular texture. In all the rocks the plagioclase is subhedral to euhedral and the potash feldspar and quartz anhedral and interstitial.

Quartz (19-38%) occurs as anhedral composite grains with sutured boundaries, wavy extinction and in one sample the quartz grains are granulated around their borders.

The alkali feldspar (33-76%) comprises anhedral microcline and microcline perthite (both string and patch perthite), anhedral to subhedral albite (An0-3) grains, varying from fairly fresh grains to brownish, dusty irregularly sericitized grains showing albite twinning. In one of the rocks the albite contains irregular grains of epidote. Myrmekitic intergrowths of quartz and plagioclase feldspar occur in irregular grains.

Ferromagnesian minerals comprise biotite (3-21%) as greenish-brown, fine aggregates pleochroic from brown to pale yellow, and as bleached colourless grains rimmed by opaque minerals; and chlorite (5-6%) as irregular grains pleochroic from pale green or greenish brown to yellow with epidote parallel to the cleavage. This chlorite is mainly formed from the biotite, but in many cases it is after hornblende which it pseudomorphs. The unaltered hornblende occurs in amounts less than 1%.

Other minerals comprise epidote (2%) as small irregular grains formed from the saussuritization of the plagioclase, sericite (13%) after plagioclase, muscovite (2%), opaque grains (up to 2%), carbonate (1%), apatite, altered titanite as euhedral and irregular grains, and hematite in amounts less than 1%.

The chemical analysis of one of these granite samples is given in column 3 of Table 14 and its molecular mesonorm in column 3 of Table 15.

Quartz Monzodiorite

Two of the samples studied in thin section are quartz monzodiorites. Both were taken from the Ellis Lake lobe of the Crossman Lake Batholith near fault contacts with the mafic metavolcanics.

One rock is dark greenish-pink on the weathered surface, pink on the fresh surface and is massive and medium grained. Quartz is not visible, the feldspar grains measure 2 X 3 mm and the dark green ferromagnesian minerals, hornblende and chlorite, range from 1 X 1 mm to 3 X 3 mm. The other rock is coarser and pale pink on both the weathered and fresh surfaces. Quartz is visible and measures 3 X 7 mm. The feldspars occur as laths 5 X 8 mm and the ferromagnesian minerals as laths 1 X 3-5 mm and as clots 3 X 4 mm. The ferromagnesian material is hornblende.

The quartz (12-19%) consists of anhedral interstitial grains showing wavy extinction and curved boundaries.

The alkali-feldspar (10-26%) comprises microcline and microcline perthite (patch and string perthite) as anhedral interstitial grains which show no wavy extinction and are mostly fresh. This alkali-feldspar contains irregular grains of calcite where it adjoins altered hornblende.

The plagioclase (49-63%) consists of albite and oligoclase (An9-15) as euhedral and subhedral grains which, though mostly fresh, are variably and patchily sericitized to a brownish dusty appearance. Twinning is polysynthetic albite twinning. Myrmekite occurs marginal to the plagioclase and is lobed into the alkali feldspar.

Ferromagnesian minerals comprise hornblende (2%) as rhomb- and lath-shaped grains pleochroic from pale green to yellow. They are fresh with square-shaped opaque inclusions, or are altered to a mixture of chlorite, calcite, epidote and opaque minerals. Chlorite (3-13%), occurs as irregular grains with ragged terminations, pleochroic from pale green to pale yellow, and was formed probably as an alteration product of hornblende.

Other minerals present comprise calcite (2%) which occurs in association with chlorite and opaque minerals, epidote (1%) and titanite, opaques and apatite all less than 1%.

Quartz Monzonite

Two of the rock samples studied in thin section are quartz monzonites. Both samples are from within 150 feet of the contact with mafic metavolcanic rocks and were taken from the Ellis Lake lobe of the Crossman Lake Batholith. They are pink both on the weathered and fresh surfaces and are massive medium- to coarse-grained rocks. The quartz grains measure about 1 X 1 mm the grey feldspars range from 2 X 4 mm to 3 X 10 mm. Ferromagnesian grains are in equant grains 2 X 2.5 mm and lath-shaped grains 1 X 3 mm. In one of the rocks a mafic clot measures 20 X 10 mm.

The texture of both rocks is hypidiomorphic granular and the minerals are mostly fresh.

The quartz (18%) occurs as anhedral, interstitial composite grains with straight or slightly curved boundaries and showing wavy extinction.

The alkali-feldspar (34-36%) comprises microcline as equant anhedral grains, dusty and pale brownish showing grid-twinning, and microcline perthite (patch and ribbon perthite). The margins of the grains enclose smaller quartz grains.

The plagioclase (39-42%) consists of albite-oligoclase and oligoclase (An10-11) occurring as subhedral grains fresh in one rock and variably altered in the other to brownish sericitized areas. Some grains contain yellow epidote. Albite twinning is present.

Ferromagnesian minerals comprise: (1) hornblende (4-6%) occurring as laths and grains with rhombic cross-sections, pleochroic from pale green to yellow, enclosing opaque grains and twinned on (100) with some grains showing marginal alteration to brown biotite; (2) biotite (less than 1%) as brown grains with ragged terminations, and (3) chlorite as pale green pleochroic aggregates pseudomorphic after hornblende and associated with biotite.

Other minerals comprise square and irregularly-shaped grains of pyrite, euhedral grains of apatite, euhedral brown titanite, and irregular grains of epidote.

Quartz Alkali-Feldspar Syenite

Only one sample among those modally analyzed is a quartz alkali-feldspar syenite. This rock was collected within 30 m of the contact of the batholith with the mafic metavolcanics.

The rock is pink on the fresh and weathered surfaces and is massive and medium grained. No quartz was visible on the weathered surface, and the feldspar grains average 2 X 3 mm. The ferromagnesian mineral is greenish-black and occurs as laths 1 X 4 mm and as rudely equant areas 2 X 3 mm. Clots of dark green mafic material can be seen in the rock, the largest being 20 X 11 mm.

In thin section the rock shows hypidiomorphic granular texture with some peripheral granulation of the grains.

The quartz (8%) occurs as composite grains showing wavy extinction due to strain.

The alkali-feldspar (64%) comprises microcline (28%) as equant anhedral grains showing grid twinning and subhedral mostly fresh grains of albite (An2) amounting to 36% and showing albite-acline complex twinning. Some of the albite grains contain grains of epidote. Wavy extinction in some grains of albite can be observed.

Ferromagnesian minerals comprise hornblende (11%) as euhedral and subhedral grains pleochroic from brownish to brownish-green, and chlorite (7%) as flakes with ragged edges and epidote along cleavage cracks. The chlorite is pleochroic from light yellow to yellow green. Both these minerals occur as irregular stringers along the grain boundaries of the felsic minerals and grouped together in clots.

Other minerals include irregular grains of yellow epidote (8%) which also forms veins traversing the rock, leucoxene (2%)

and apatite, titanite and carbonate occurring in amounts less than 1% each.

Minor Phases

In areas close to the margins of the batholith and within the margins of the batholith itself micrigranitic rocks, porphyries, aplites and pegmatites and irregular bodies of quartz were encountered. These are regarded by the author as minor intrusive phases of the batholith because of field association, and intrusive relationships to the supracrustal rocks. These rocks occur as dikes, and irregular masses.

Microgranitic Rocks

These are grey, fine-grained rocks occurring as dikes near the borders of the batholith. One such dike with an east-west trend occurs at Harvie Lake in the north-central part of the map-area. The rocks forming this dike are massive, grey on both the fresh and weathered surfaces and have a low colour index of about 2. The ferromagnesian mineral is biotite, and grains of pyrite less than 0.5 mm are disseminated through one of the rocks. The dike is about 46 m (150 feet) wide and 1280 m (4200 feet) long and shows intrusive relationships with the surrounding mafic metavolcanics.

No thin sections of these rocks have been studied.

Quartz Porphyries

One example of quartz porphyry occurs as two dikes about 46 m (150 feet) wide and probably 305 m (1000 feet) long about 1.6 km west of Harvie Lake. The rock is pinkish grey on the weathered surface and grey on the fresh surface. The phenocrysts are subhedral quartz varying from 2 X 2 mm to 4 X 6 mm, locally to 7 X 9 mm. The rest of the rock weathers away leaving quartz as knobs on the surface of the rock. The ferromagnesian mineral is biotite and the colour index of the rocks is about 1.

Quartz-Feldspar Porphyries

An example of the quartz-feldspar porphyries occurs west of Syenite Lake in the east-central part of the map-area as a northeasterly trending dike about 30 m wide and 1.6 km long on the basis of outcrop and associated photo lineament. The rock is dark grey in colour and shows light grey subhedral lath-shaped and equant grains of feldspar 2.5 X 6 mm and 3 X 3 mm respectively, and less conspicuous phenocrysts of bluish subhedral quartz about 1 X 1.5 mm, set in a dark grey granular fine-grained matrix. The ferromagnesian mineral is biotite and the colour index of the rock is about 3.

Aplite

A narrow 0.5 m aplite dike cuts the marginal granitic rocks at the southern margin of the batholith near its western end about 2.8 km northwest of Sox Lake. The dip of the dike is vertical and the rock is very fine grained, grey on both the fresh and weathered surface and shows a weak foliation as marked by dark grey streaks, probably of biotite. The rock is mineralized with fine flakes of molybdenite on joint faces. Aplite is not a common rock type of the batholith. The significance of aplite to molybdenite-chalcopyrite mineralization is discussed in more detail in the section on mineralization, and in the Economic Geology Section.

Quartz masses

Irregular bodies of quartz up to 46 m x 15 m occur at the southwestern margin of the batholith about 2.8 km northwest of Sox Lake. These masses occur in the area of molybdenite-chalcopyrite mineralization. They are free of all minerals except molybdenite and chalcopyrite and are regarded as end-stage differentiates of the granitic magma. In the same area the quartz also occurs as veins that trend east-southeast and are up to 3 m wide by 15 m long. These quartz masses are discussed further in the Economic Geology Section.

Mineralization

Mineralization occurs in three areas within the batholith: in the western part about 2.8 km northwest of Sox Lake in the southwestern part of the map-area (the Sox Creek Occurrence); in its eastern part at the southwestern corner of Owl Lake at the central part of the eastern boundary of the map-area (the Owl Lake Occurrence); and at the west-central marginal part of the batholith in the neighborhood of its contact with gabbro (Nicopor Occurrence). All these deposits occur at the margins of the batholith, within 90 m of the contacts. The Sox Creek Occurrence and the Owl Lake Occurrence comprise molybdenum-copper and molybdenum mineralization respectively and the Nicopor Occurrence is a nickel-copper occurrence. These occurrences are fully described in the Economic Geology Section, and are therefore only briefly described here. In the

Sox Creek Occurrence molybdenite and chalcopyrite occur as stringers and fine disseminations in quartz veins; as stringers, lenses and disseminations in ptygmatic quartz veins in foliated granodiorite; and as stringers and disseminations in biotite-quartz feldspar paragneiss containing quartz porphyroblasts located at a contact zone between granodiorite and interlayered supracrustal metasediments and metamorphosed mafic volcanics. In the Owl Lake Occurrence molybdenite occurs as blebs and rosettes or irregular stringers in quartz veins in the granitic pegmatitic and aplitic rocks. At the Nicopor Occurrence mineralization consists of disseminated massive chalcopyrite, nickeliferous pyrrhotite and pyrite in leucocratic hornblende granite.

Whitesand Lake Batholith

This batholith, located in the southwestern part of the map-area, extends in an east-west direction for 16 km - and in a north-south direction for about 8 km but extends westwards and southwards beyond the limits of the map-area. Within the map-area the batholith is elongated in an east-west direction parallel to the structural trend in the enclosing supracrustal rocks. Pink and grey phases occur. The pink phase predominates and underlies most of the area west of Walker Lake. Modal analysis of two rocks typical of this phase shows that these rocks are alkali-feldspar granites. The grey rocks vary from monzodiorite to quartz monzonite and are exposed principally around Walker Lake. The rocks comprising this batholith are all massive and vary from medium to coarse grained.

Major Phases

Alkali-Feldspar Granite

Biotite alkali-feldspar granite consists of both a massive and a porphyritic phase. The massive phase comprises the major part of the batholith, the subordinate porphyritic phase is confined to the northwestern part of the batholith.

Massive Facies

This biotite alkali-feldspar granite is pink on both the weathered and fresh surfaces, and the two samples studied were taken from the interior parts of the batholith. Their modes are given in columns 1 and 2 of Table 16. One of the samples has an average grain size of the quartz and feldspar of 2 mm, the ferromagnesian mineral grains are 0.5 X 0.5 mm. The colour index of the rock is 1. The other sample is medium grained, the quartz grains being an average 3 X 4 mm, the feldspar which is pink 1.5 X 4.5 mm on the average. The ferromagnesian mineral occurs as wispy grains 4 X 0.5 mm or in laths 1 X 3 mm.

The texture of both rocks is hypidiomorphic granular the plagioclase grains being subhedral and anhedral associated with anhedral potassium feldspar and quartz.

The quartz (22-34%) occurs predominantly as single anhedral grains with straight, irregular and lobate boundaries and shows wavy extinction.

The alkali feldspar (64-77%) comprises microcline and microcline perthite (patch type) which is fresh and comprises 30-33% of the rocks, and albite (An0-2) amounting to 31-47% and which is also mostly fresh. The microcline shows the development of grid twinning and occurs as anhedral grains, but some grains and parts of grains are devoid of twinning and may be orthoclase. The albite grains are subhedral, most of which are only slightly altered to sericite or show a dusty brownish coloration. Some of the grains contain a few grains of epidote or muscovite parallel to cleavage plains. Twinning is mainly polysynthetic albite type, but Carlsbad twinning was observed in one grain.

Ferromagnesian minerals are biotite (1%) and chlorite (1%) as lath-shaped grains with straight or irregular terminations, and irregular stringers. The biotite is pleochroic from pale brown to greenish brown. The chlorite occurs as irregular grains pleochroic from pale green to yellow and shows mauve anomalous interference colours with opaque grains along cleavages. In some cases the chlorite can be seen to be an alteration product of the biotite. The chlorite also occurs as clotted areas in association with epidote, calcite and opaque grains.

Muscovite, epidote and opaque grains occur in amounts less than 1%.

Chemical analyses of both these samples are listed in columns 1 and 2 of Table 17. They are calcalkalic in chemical composition.

Porphyritic Facies

A pink, coarse-grained porphyritic facies of these rocks occurs at the northwestern border of the batholith in the northwestern corner of the map-area. The facies outcrops over an area measuring 1.5 X 4 km. This rock is pink on both the weathered and fresh surfaces and shows subhedral phenocrysts of quartz ranging from 2 X 3 mm to 4 X 6 mm. The mafic mineral is biotite and the colour index is about 2. This rock has not been studied in thin section but because of its similarity with the above rocks it is believed to be a porphyritic alkali-feldspar granite.

Quartz Monzonite

This rock is massive, coarse-grained and grey both on the weathered and fresh surfaces. This unit occurs in the west-central part of the batholith at McLean's Lake as a small mass measuring about 200 m by 200 m. The average grain-size of the feldspars, which are grey is 5 X 6 mm. The quartz grains are 3 X 4 mm, and the lath-shaped grains of hornblende are 1 X 4 mm, the irregular grains being 2 X 3 mm. Biotite occurs as equant grains about 1.5 x 1.5 mm. The colour index of the rock is about 10, and its mode is given in column 3 of Table 16.

The texture of the rock is coarse hypidiomorphic granular consisting of broad subhedral lath-shaped plagioclase associated with smaller equant and irregularly-shaped microcline and anhedral interstitial quartz.

The quartz (16%) consist of anhedral composite grains with sutured boundaries and wavy extinction.

The alkali feldspar (28%) consists of anhedral, interstitial grains of microcline which show characteristic grid-twinning but with other grains devoid of this twinning. The potassium feldspar shows patch and string perthite structure.

The plagioclase (43%) is oligoclase (An26) and it occurs mainly as fresh, subhedral grains, some of which have sericitized cores or are completely sericitized. Albite twinning is present as well as Ala or acline twins. Myrmekite is developed at plagioclase-alkalic feldspar grain boundaries with the myrmekite lobed into the alkali feldspar.

Ferromagnesian minerals (11%) comprise biotite (6%) which occurs as flakes with ragged terminations and is pleochroic from greenish-brown to pale yellow; and hornblende (5%) which is fresh, subhedral, simply twinned in some grains and pleochroic from green to yellow.

Other minerals comprise epidote (1%) occurring as grains in biotite parallel to the cleavage, and titanite, apatite and chlorite after biotite, all less than 1% each.

The chemical analysis of this rock (NN5-6) is listed in column 3 of Table 7 and its molecular mesonorm in column 1 of Table 18.

Monzodiorite

This rock is massive, medium grained and pinkish grey on the weathered and fresh surfaces. No quartz is visible in hand specimen. The feldspars average about 2.5 X 0.7 mm, the mafic minerals 1 x 3 mm. The colour index of the rock is about 24 and its mode is given in column 4 of Table 16. This unit occurs at the southeastern end of the batholith at Walker Lake, and extends over an area of 1 by 0.5 km.

The quartz (12%) occurs as interstitial composite grains with straight and curved boundaries and wavy extinction.

The alkali feldspar (15%) consists of interstitial anhedral untwinned grains and may be orthoclase. No grid twinning was observed in this alkali-feldspar.

The plagioclase (48%) is oligoclase-andesine (An30). It occurs as subhedral brownish laths, which range from being patchy to almost completely sericitized. Minor amounts of epidote occur in some grains.

The ferromagnesian minerals comprise hornblende (18%) and biotite and chloritized biotite (these two combined amounting to 6%). The hornblende is mostly fresh, pleochroic from green to pale yellow and occurs as subhedral and anhedral laths. Some grains are twinned parallel to (100) and some of this twinning is multiple. The biotite occurs as laths with ragged terminations pleochroic from brown to pale yellow and shows alteration with opaque minerals aligned along the cleavages.

Other minerals include titanite, apatite, opaques, and calcite, all less than 1%. Calcite is commonly associated with the biotite.

The chemical analysis of this rock is given column 4 of Table 17 and molecular mesonorm in column 2 of Table 18.

Minor Phases

Aplite

Minor phases comprise narrow dikes of aplite cutting the pluton both in its interior and of its margin. They are fine grained pink and pale pink with colour index <1.

Mineralization

Molybdenum-copper mineralization occurs at internal contact zones in the northwestern part of the batholith (Sox Creek Occurrence) and at its southeastern margin (Halonen Occurrence, Ellwood Occurrence). The deposits are classed as vein-type rather than porphyry-type mineralization by the writer as discussed in the Economic Geology Section.

At the Sox Creek Occurrence the mineralization is associated with a contact migmatite zone, and the molybdenum and copper occur as disseminated blebs, plates, and stringers of molybdenite and chalcopyrite impregnating quartz veins, ptygmatic quartz veins, quartz lenses and irregular quartz masses.

The Halonen Occurrence at Walker Lake in the southeastern margin of the batholith occurs 0.5 km from its contact with mafic metavolcanics. In this occurrence molybdenite and chalcopyrite occur in quartz veins and stringers cutting pink granite encountered in drilling.

The Ellwood Occurrence is located 0.6 km south of the Halonen Occurrence. It consists of flecks of molybdenite and chalcopyrite in a northeasterly-trending quartz vein cutting felsic to intermediate metavolcanics 40 m from the contact with the batholith. Here the plutonic rocks are monzodioritic.

Terrace Bay Batholith

This batholith is located in the southeastern part of the map-area. The entire batholith is not contained within the limits of the map area, but reference to Map 2107 (Walker 1967) shows that the batholith is oval-shaped with an N70°E axial trend. The southwestern end of the batholith is cut off by the

Worthington Bay Fault located at the central part of the southern boundary of the map area. Thus the length of the batholith is at least 26 km. Its width is approximately 8 km.

The predominant rock type in the batholith is a pink massive medium-grained, biotite-hornblende granodiorite to biotite alkali-feldspar granite with minor grey hornblende-biotite quartz diorite to hornblende-biotite quartz monzonite. The grey and the pink rocks were seen in the field to grade into each other and did not appear to be discrete intrusions.

Minor intrusive bodies as narrow dikes and irregular bodies cut the batholith. They are dark reddish brown, with phenocrysts of hornblendes in a dark reddish brown matrix. Their texture as seen in thin section, is bostonitic or trachytic, and quartz is minor or absent. These hornblende porphyries were best observed in the southwestern part of the batholith. At the northwestern border of the southwestern part of the batholith, marginal pink aplite and pegmatite occur mineralized with molybdenite and chalcopyrite. Within about 1 km of the contact of the batholith with mafic metavolcanic rocks, dark reddish brown mica lamprophyres, grey and cream feldspar porphyries, quartz feldspar porphyries, hornblende-feldspar porphyries, aplite and pegmatite (associated with gold mineralization at the Jedder Occurrence) occur as dikes cutting the metavolcanic rocks. The mica lamprophyres closely resemble the hornblende porphyries except that their grain size is a little coarser. These rocks are believed by the author to represent off-shoots of the batholith. At the contact zone west of the southwestern end of Hays Lake microgranitic dikes cutting the metavolcanics can be traced into the batholith itself.

Major Phases

Alkali-Feldspar Granite

This rock type, together with the similar-looking biotite-hornblende granodiorite comprises most of the batholith except for a small marginal area at the southwestern part of the batholith. Modal analysis of two rocks shows that the alkali-feldspar granite occurs along the northern boundary of the batholith but is not necessarily restricted to it. The rock type is pink, massive and medium-grained with a colour index of 1-3.

The modes of two rocks of this unit are listed in columns 1 and 2 of Table 19. Both rocks are from the margin of the batholith, are medium grained, pink on the fresh and weathered surfaces and vary from massive to slightly foliated. The foliation in the foliated sample taken from the northeastern margin of the batholith is marked by elongated quartz and streaks of mafic minerals. It is considered by the author to represent localized faulting as it is confined to the immediate border zone of the batholith only in this area. The quartz grains vary from about 1 X 1 mm to 2 X 8 mm in the foliated rock. The pink and buff feldspars vary from 1 X 1.5 mm to 2 X 2 mm. Biotite and chlorite are 1 X 1 mm to 1.5 X 5 mm in the foliated unit. The colour index of the rocks varies from 1-3.

The texture of both rocks shows the effects of cataclasis. The foliated rocks shows cataclastic texture with subhedral augen and grains of plagioclase with crushed borders surrounded by curved streaks of mosaic quartz showing mortar structure. The massive rock shows equant grains of feldspar with sutured boundaries surrounded by quartz grains also showing highly sutured boundaries. Very few of the feldspars show straight borders.

The quartz (21-31%) occurs as mosaic structure ribbons around plagioclase, is commonly granulated, shows sutured boundaries and wavy extinction.

The alkali feldspar (25-40%) consists of grid twinned microcline, and an untwinned alkali feldspar that is probably orthoclase occurring as whole grains or as untwinned parts of microcline. It is unsericitized, crushed and interstitial. Microcline perthite also occurs as string perthite.

Plagioclase (25-43%) occurs as subhedral and anhedral grains, is pale brownish and some grains are sericitized with larger muscovite flakes parallel to the cleavages. Alteration in some grains is to sericite and calcite. Twinning is polysynthetic albite and Carlsbad-albite complex twinning.

Ferromagnesian minerals comprise biotite (<1%) and chlorite (3%) as lath-shaped grains with ragged terminations and the chlorite also occurs as ribbons wrapping round the quartz and feldspar.

Other minerals comprise calcite (7%), epidote (2%), opaque grains (about 1%) and muscovite (<1%).

Granodiorite

One of the rocks studied in thin section is a biotite-hornblende granodiorite, taken from the interior part of the batholith. This rock type, together with the similar-appearing biotite alkali-feldspar granite, comprises most of the batholith except for a small marginal area in the southwestern part of the batholith. The mode is listed in column 3 of Table 19. The rock is pink, massive, and medium to coarse grained on both the weathered and fresh surfaces. The average grain size of quartz and feldspar grains is about 3 X 3-4 mm, with some grains as large as 5 X 9 mm. The ferromagnesian grains are mainly lath-shaped and measure 1 X 2 mm but almost equant grains measure 3 X 4 mm.

The texture of the rock is hypidiomorphic granular, consisting of mainly subhedral with a few euhedral grains of plagioclase associated with anhedral potassic feldspar and anhedral interstitial quartz.

The quartz (33%) consists of anhedral interstitial grains some of which are not composite grains, and show slightly wavy extinction.

The alkali feldspar (8%) is interstitial and anhedral consisting of untwinned grains and may be orthoclase. Some of the grains enclose plagioclase or myrmekite.

The plagioclase (51%) consists of oligoclase (An13) as euhedral and subhedral grains, brownish in colour and shows polysynthetic albite twinning with some simple Carlsbad twins.

The ferromagnesian minerals are biotite (5%) which is altered to chlorite and associated with bright yellow epidote along cleavages and hornblende (4%) as laths pleochroic from green to yellow green as euhedral, subhedral and anhedral grains. Some of the hornblende grains are altered to epidote and are twinned.

Other minerals present are opaque grains and epidote.

Quartz monzonite

This rock is grey on the weathered and fresh surfaces. The quartz grains measure about 3 X 3 mm, the feldspars 1.5 X 4 mm, and the hornblende, which occurs as laths 1 X 4 mm. The mode of this rock is listed in column 4 of Table 19. The texture of the rock is hypidiomorphic granular. The plagioclase grains are euhedral and subhedral, the other felsic minerals are anhedral.

The quartz (18%) is interstitial and shows wavy extinction.

The alkali-feldspar (43%) consists of large poikiloblastic grains containing quartz, plagioclase, hornblende and titanite. No grid twinning is visible and the potassic feldspar is optically identified as orthoclase.

The plagioclase (36%) is mainly fresh, euhedral and subhedral oligoclase (An20) some of which is normally zoned. Some of the grains are brownish and dusty, and twinning comprising Carlsbad, albite and Ala or acline twinning can be observed. Myrmekite is also present.

The ferromagnesian minerals are euhedral and subhedral hornblende (3%) grains pleochroic from pale yellow to green. Some are recrystallized to aggregates. Biotite (<1%) forms rectangular grains pleochroic from pale yellow to brown, some of which are altered to chlorite with the release of opaque grains along the cleavage. Brownish epidote, containing apatite, is also seen occurring along the cleavages of the biotite. Other minerals are subhedral and irregular grains of titanite, and opaque ilmenite rimmed with titanite.

Quartz Monzodiorite

This rock type closely resembles the quartz monzonite in hand specimen. The rock is massive, medium grained, and grey on the fresh and weathered surfaces. The quartz grains are about 1.5 mm X 2 mm, the feldspar grains average 1.5 mm X 2.5 mm and the hornblende occurs as laths 1 mm X 2 mm. The texture of the rock is hypidiomorphic granular with euhedral and subhedral plagioclase surrounded by anhedral interstitial potassic feldspar and quartz. Its mode is given in column 5 of Table 19.

The quartz (12%) forms anhedral interstitial grains with wavy extinction.

The alkali feldspar (13%) consists of fresh, anhedral untwinned grains which may be orthoclase.

The plagioclase (58%) consists of oligoclase (An22) forming euhedral and subhedral grains which are dusty and brownish in the centre, and sericitized and carbonatized. Albite and Carlsbad twinning are present, and some grains are zoned. Myrmekite occurs at the contact of plagioclase and potassic feldspar and is lobed into the latter.

Ferromagnesian minerals comprise hornblende (14%) consisting of euhedral and lath-shaped grains pleochroic from green to yellow green, chlorite (1%) with opaque grains and epidote occurring along the cleavage, probably as an alteration product of biotite, and associated with calcite.

Other minerals comprise opaque grains (1%) titanite, hematite, apatite, and carbonate in amounts less than 1%.

Minor Phases

Minor phases of the batholith occur as dikes and irregular intrusive bodies cutting the main intrusion itself, occurring as apophyses of the batholith at its contact with the metavolcanic rocks or as independent dikes intruding the supracrustal rocks within 1.5 km at the contact. These latter are considered to be related to the batholith on the grounds of proximity and lithological resemblance to dikes cutting the intrusion itself.

The minor phases comprise aphyric rocks (aplites and pegmatites) and porphyritic rocks: quartz-feldspar porphyries, feldspar porphyries, biotite porphyries and hornblende porphyries. These rocks are pink, brown and grey.

Aplites

These are pink, fine-grained rocks associated with the main pluton. They also occur as dikes. Aplite associated with the main mass occurs at its northwestern margin at the Pitkanen Occurrence as ramifying dikes associated with molybdenum-copper mineralization as described under Mineralization below; and as northeast trending dikes and stringers at the Jedder Occurrence associated with gold mineralization 400 metres northwest of the granitic contact. These rocks were not studied in thin section. Aplite is not a common rock type of the batholith.

Pegmatites

These rocks are pink on the fresh and weathered surfaces and were found cutting the main mass in the same areas mentioned above under Aplites. They are associated with the same type of mineralization as described below under Mineralization.

Porphyries

Quartz-Feldspar and Feldspar Porphyries

These are pink and grey rocks, the grey rocks predominating. The grey rocks occur cutting the metavolcanic rocks within 1.5 km of the contact, whereas the pink rocks are confined to dikes cutting the batholith itself.

The grey porphyries consist of euhedral phenocrysts of grey vitreous quartz measuring from 2 X 1 mm to 7 X 4 mm, and white weathering euhedral and subhedral feldspars varying from 2 X 1 mm to 6 X 4 mm. Most of these rocks are free of ferromagnesian phenocrysts but in one case euhedral phenocrysts of hornblende 4 X 1 mm accompany the quartz and feldspar, but are subordinate in amount to them.

In thin section the grey quartz-feldspar, feldspar and hornblende-feldspar porphyries show porphyritic micro-granular texture, the matrix consisting of a microgranular arrangement of quartz and feldspar. The pink porphyries show a similar matrix. The quartz grains are subrounded, euhedral and subhedral, simple and composite grains. The feldspar phenocrysts are plagioclase variably altered but commonly fresh and euhedral for the most part. Where the ferromagnesian minerals do not form phenocrysts they are in accessory amounts and comprise chlorite, hornblende and biotite. Where the ferromagnesian minerals form phenocrysts along with the salic minerals they comprise biotite and hornblende. The biotite forms subhedral grains pleochroic from light to dark brown.

The hornblende occurs as euhedral and subhedral phenocrysts pleochroic from green to yellow. In some grains aggregate structure could be observed suggesting recrystallization.

The chemical analyses of three of these quartz-feldspar porphyries is listed in columns 1, 2, and 3 of Table 20 and their mesonorms are listed in columns 1, 2 and 3 of Table 21.

Hornblende Porphyries

The hornblende porphyries are dark grey both on the weathered and fresh surfaces. They occur as short narrow dikes cutting the batholith at its southwestern part.

In thin section the hornblende forms lath-shaped phenocrysts 3 X 1 mm set in a coarse microlitic matrix of disoriented plagioclase grains. The hornblende is pleochroic in shades of green, and some grains are composite aggregates. Phenocrysts of plagioclase, some of which are zoned (An_{21-67}), are visible in thin section but not in the hand specimen. These grains are euhedral, brownish, and variably altered with clear rims. The matrix consists of microlitic andesine (An43) with interstitial quartz and biotite; and opaque grains. The modal analysis of this rock is listed in column 6 to Table 19. The rock is a quartz diorite porphyry. Its chemical analysis is listed in column 4 of Table 20 and its molecular mesonorm in column 4 of Table 21.

Lamprophyres

These rocks occur as narrow dikes averaging 4 m wide, and irregular intrusive masses up to 100 m by 20 m. They are brown on the weathered surface and brown or mauve on the fresh surface. Four thin sections of these rocks were studied and three were chemically analyzed and listed in colours 5 and 6, of Table 20, and their mesonorms in columns 5 and 6 of Table 21. The hornblende phenocrysts are euhedral and subhedral and are pleochroic from pale yellow green to yellow and show alteration to calcite and epidote. The biotite is greenish-brown and pleochroic from greenish-brown to colourless or is pale yellowish-brown and then pleochroic from yellow to pale yellow. Phenocrysts of chlorite occur in one of the rocks and appear to be pseudomorphs after hornblende. The texture of the matrix of these rocks varies from felted to trachytic and bostonitic, in which a combination of partially oriented microlites and broader sheaf-like arrangements of feldspar occur. The feldspar microlites show simple and polysynthetic twinning and the interstices contain chlorite, calcite and opaque grains. The plagioclase is too altered for optical determination. Potassic feldspar occurs as laths and interstitially. In these rocks the hornblende and biotite are primary constituents, but these minerals show alteration to chlorite, epidote and calcite in the case of the hornblende, and to chlorite in the case of biotite. The feldspar is also altered and shows wavy extinction, and the rocks therefore cannot be classified modally. The mesonorms of these rocks are also unreliable indicators of the primary mineralogy; for example,in one sample RR 12-4 the rock contains modal hornblende but no modal biotite whereas the mesonorm shows only modal biotite and no hornblende. In the case of the other samples RR 11-10 the rock shows modal biotite and potassium feldspar, whereas the mesonorm over-estimates the biotite content and shows no modal potassium feldspar. Thus the mesonorm as calculated cannot be used as a reliable estimate of the quartz-alkali feldspar-plagioclase parameters for classification in the Streckeisen (1976) classification of granite rocks. The low modal quartz content of these rocks of <1% suggests that these rocks are the dike and minor intrusive equivalents of the quartz-poor hornblende-biotite quartz monzonites and hornblende quartz monzodiorites. These lamprophyres markedly resemble brown alkalic metavolcanic rocks mapped in the Shining Tree Area in MacMurchy, Tyrrell (Carter 1977) and Natal and Knight (Carter 1983) Townships.

Mineralization

Mineralization within the Terrace Bay batholith occurs in the western half of the pluton and consists of molybdenum - copper, molybdenum and gold.

Mineralization within the Terrace Bay batholith occurs in the western half of the pluton and consists of molybdenum - copper, molybdenum and gold.

Molybdenum-copper vein-type mineralization occurs in aplite, pegmatite and quartz veins in the northwestern marginal zone in the southwestern part of the pluton (Pitkanen Occurrence, located in property No. 48, the Blanchford Occurrence also located in property No. 48, and the Mackenzie Occurrence, No. 9). Other occurrences located within the batholith are the Univex Exploration Development East Occurrence, No. 66, and the Aguasabon River No. 2 Occurrence. These occurrences are described in the Economic Geology section of this report.

Gold mineralization occurs at the Gale Occurrence (No. 20) in a quartz vein in a shear zone at the north-western margin of the batholith in the southwestern part of the pluton. Gold also occurs in a shear zone at the Worthington Bay No. 1 Occurrence (see No. 70) located south of the Gale Occurrence on the shore of Lake Superior. In both cases these gold occurrences have associated copper. An occurrence of gold was reported (Canadian Mining Review, 1890) near the northeastern shore of Terrace Bay in Mineral Location No. 4. This occurrence was not relocated during the current survey. The mineralization was said to consist of chalcopyrite, auriferous and argentiferous galena and molybdenite. All these occurrences are described in the Economic Geology section.

Mount Gwynne Pluton

This pluton is located near the southern margin of the central part of the map-area on Schreiber peninsula. It is fault bounded on its northern, eastern and western sides and intrudes the metavolcanic rocks on its southern boundary. The pluton is wedge-shaped and is about 5 km long by 1.5 km wide at its widest part.

The rocks are massive, medium grained, and pink or grey on the weathered and fresh surfaces. The northern half of the pluton is underlain by quartz-rich rocks comprising pink alkali-feldspar granite and biotite-hornblende granodiorite. The southern half is underlain by quartz-poor pink, massive, medium-grained hornblende-biotite quartz monzonite, and grey, massive coarse-grained actinolite quartz diorite. The pluton is cut by a medium-grained, dark blue-grey 15 m wide dike 30 m long striking N 50W of alkalic biotite-alkali-feldspar quartz syenite at its northern part. The pluton is thus a composite mass.

Major Phases

Alkali-Feldspar Granite

The pink alkali-feldspar granite has quartz grains measuring about 2 X 2 mm, pink and dark red feldspar grains averaging 3 X 2 mm, and lath-shaped 2 X 1 mm to equant chlorite about 1 X 1 mm. The texture of the rock is hypidiomorphic granular. The mode of the rock is given in column 1 of Table 22.

The quartz (20%) consists of composite anhedral grains with wavy extinction both straight and curved boundaries.

The alkali feldspar (35%) comprises microcline and microcline patch-perthite. Both grid twinning and Carlsbad twinning are seen in the potassium feldspar, which occurs in anhedral equant grains and irregular interstitial grains.

The plagioclase (42%) is albite (An3) in euhedral and subhedral brownish, dusty and variably sericitized grains, with polysynthetic albite twinning.

The ferromagnesian mineral is chlorite (3%) in broad laths with irregular terminations. It is pleochroic from pale green to pale yellow and has opaque grains aligned along the cleavage.

Other minerals are epidote and titanite which occur in clots and both in amounts less than 1%.

Granodiorite

Two of the rocks examined in thin section are granodiorites. They are pink on the fresh and weathered surfaces, massive and medium grained. The quartz grains measure about 1 X 1 mm, the feldspars which are pink vary from about 2 X 0.5 mm to 3 X 1 mm, and the ferromagnesians occur in laths 2 - 3 X 1 mm and in irregular clots up to 6 X 3 mm. In thin section the rocks show hypidiomorphic granular texture. The modes of these two rocks are given in columns 2 and 3 of Table 22.

The quartz (23% in both cases) occurs as anhedral composite grains showing wavy extinction.

The alkali feldspar (18-21%) occurs as anhedral grains of mainly untwinned potassium feldspar with minor microcline showing grid twinning. Some grains are patch perthite; and some are dusty and brownish along and adjacent to the cleavages.

The plagioclase (43-48%) comprises oligoclase (An16-23) occurring as pale brownish subhedral grains variably sericitized and containing a few grains of epidote and larger flakes of muscovite. The rims of many grains are unaltered.

Ferromagnesian minerals comprise biotite (1-11%) pleochroic from pale green to yellow, chlorite (8%) after biotite, and hornblende (2%) pleochroic from green to yellow with ragged ends and poikiloblastic texture for some grains.

Other minerals present include calcite (2%), opaque grains (2%) and epidote and titanite, both less than 1%. The chemical analysis of one of these two rocks is given in column 2 of Table 23 and its molecular mesonorm in column 2 of Table 24.

Quartz Monzonite

This unit, underlying the southwestern quarter of the pluton is pink on both weathered and fresh surfaces. The feldspar grains, which are pink, measure 2 X 1 mm and the ferromagnesians occur as laths 3 X 1 mm and clots 2 X 2 mm and a few 4 X 3 mm. In thin section the rock shows hypidiomorphic granular texture. The mode of this rock is given in column 4 to Table 22.

The quartz (10%) occurs as irregular, composite, interstitial grains with straight and curved boundaries.

The alkali-feldspar (10%) consists of anhedral clear interstitial grains of untwinned feldspar, which may be orthoclase.

The plagioclase (59%) consists of almost entirely sericitized euhedral and subhedral grains, but one partly clear grain is oligoclase (An20).

Polysynthetic twinning is seen in some grains.

The ferromagnesian minerals comprise lath-shaped and euhedral cross-sections of hornblende (12%) pleochroic from pale green to yellow, and biotite (6%) occurring as equant rectangular grains altered to green chlorite (2%).

Other minerals present are opaque grains, calcite, apatite and epidote all less than 1%. The chemical analysis and molecular mesonorm are given in columns 3 of Tables 23 and 24 respectively.

Quartz Diorite

This rock is a grey massive rock, in which quartz is not visible on the weathered surface. It forms Gwynne Mountain at the southeastern corner of the pluton. The feldspar grains are pale yellowish grey and form irregular and lath-shaped grains on average 3 X 2 mm. Among these lie dark ferromagnesian minerals measuring 1 X 1 mm to 3 X 1 mm. In thin section the rock is hypidiomorphic granular. The mode of this rock is given in column 5 of Table 22.

Quartz (5%) occurs as anhedral interstitial irregular grains showing wavy extinction.

No alkali feldspar is present.

Plagioclase (56%) consists of euhedral and subhedral thoroughly sericitized grains, which are brownish and cloudy. The normative composition of the plagioclase is andesine (An_{45}).

The ferromagnesian mineral comprises secondary actinolite (39%) which occurs as euhedral grains pleochroic from pale green to colour-less, and composite grains with small lath-shaped subgrains oriented parallel to the prismatic cleavage. The simple grains show twinning and twin seams.

Other minerals comprise opaque grains as irregular and streaked out grains.

The chemical analysis and molecular mesonorm are given in columns 4 of Tables 23 and 24 respectively.

Minor Phases

Quartz Alkali-Feldspar Syenite

In the northeastern corner of the pluton a blue-grey fine-grained dike about 15 m wide and 30 m long trending N 50o W cuts pink granitic rocks. The dike rock shows irregular subrounded grains of a white weathering mineral in a dark blue-grey matrix. In thin section it shows hypidiomorphic granular texture, and is not markedly altered. The mode of this rock is given in column 6 of Table 22.

Quartz (4%) occurs replacing feldspar as irregular composite grains and also as granular, equant-shaped grains surrounding the feldspar.

The alkali feldspar (17%) occurs as equant and irregular elongated interstitial grains up to 4.5 mm by 2.8 mm and consists of grid-twinned microcline.

The plagioclase (48%) consists of euhedral and subhedral lath-shaped albite (AnO) in grains 2 mm long by 0.9 mm wide some of which are altered to sericitic muscovite and epidote which comprise 9% and 10% of the rock respectively.

The ferromagnesian mineral comprises biotite (1%) pleochroic in shades of brown and altered to green chlorite (8%), and hornblende (<1%).

Other minerals are ilmenite-leucoxene (2%) and titanite (<1%), the latter occurring in laths and euhedral cross-sections.

The chemical analysis of this rock is given in column 5 of Table 23 and the mesonorm in column 5 of Table 24. It plots as a quartz alkali-feldspar syenite on the Q - A - P diagram Figure 14 (Streckeisen 1976).

Mineralization

Gold mineralization within the pluton occurs in the south-eastern part in a quartz vein in the pink quartz-poor facies of the pluton (see North Shores Gold Mine, No.13 in the Economic Geology Section).

Quetico Subprovince Granitic Rocks

Granitic rocks containing biotite or muscovite occur within the metasedimentary rocks of the Quetico Subprovince exposed along the northern boundary of the northeastern part of the map-area. These granitic rocks occur as: (1) highly leucocratic narrow sheets varying from one centimeter to 30 metres wide that are oriented parallel to the bedding and foliation in the metasediments, (2) as irregular ovoid and lensoid bodies up to about 1 km long by 500 m wide, parallel and subparallel to the regional trend in the metasediments, and (3) as larger irregular bodies located in the central part of the area southwest of Stingray Lake and in the eastern part of the area about Aguasabon Lake.

Sheets

The narrow sheets are best observed in the northwestern part of the area about Southpine Lake, where they are associated with the metasediments. Excellent exposures are seen along the northwest logging road crossing Southpine Lake and leading off from Mile 22 1/2 on the Kimberly-Clark of Canada Limited road. The rocks range from fine grained to pegmatitic, contain muscovite, and are white on the weathered surface, and grey on the fresh surface. They are leucocratic with colour index less than 1 and are unfoliated. Biotite-rich bands occur marginal to and within the sheets. In other places a distinct fine-grained chilled contact was observed. All the outcrops show characteristic migmatitic structures with the stromatic structure predominant; boudinage and ptygmatic structures are also present (Mehnert 1968, p. 10-11). The sheets showing marginal melanocratic selvages are interpreted to be venites, those showing a distinct fine-grained contact without melanosomes as arterites.

Lenses

The ovoid and lens-shaped masses are similar to the above but biotite-rich melanocratic selvedges were not observed. These are also oriented parallel to the intruded metasediments and are devoid of foliation structures.

Irregular Masses

The largest masses comprise quartz-rich and quartz-poor granitic rocks, and pegmatite. A foliated structure in parts of these bodies is in most cases parallel to the foliation in the surrounding metasedimentary rocks. Screens of the surrounding metasedimentary rocks are also present in the plutons. The rocks are pink or grey on the weathered and fresh surfaces. A sample from the Stingray Lake Pluton is pink biotite granite, the rock from the Aguasabon Lake Batholith is a grey chlorite quartz monzonite.

Stingray Lake Pluton

Granite

A sample from the marginal part of this pluton is massive and pink on both the weathered and fresh surfaces. The quartz grains are about 1.5 mm X 1 mm and are grey in colour. White feldspar grains are 2 mm X 3 mm across and pink weathering feldspar forms irregular composite areas. The ferromagnesian mineral is biotite occurring as irregular areas and showing a very weak preferred orientation. In thin section the rock shows allotriomorphic granular texture. Its mode is given in column 1 of Table 25.

The quartz (20%) occurs as composite grains showing wavy extinction and peripheral granulation, with sutured boundaries.

The alkali feldspar (27%) comprises microcline and microcline perthite of the string variety occurring interstitially as irregular grains. Much of this feldspar surrounds quartz and plagioclase and encloses plagioclase with embayed and cuspate boundaries indicating replacement of the plagioclase by introduced alkali feldspar material.

The plagioclase (35%) consists of subhedral and anhedral grains of oligoclase (An24) variably altered to a brownish colour. Some of the plagioclase is antiperthite and some grains are granulated and have undergone minor sericitization. Polysynthetic albite twinning occurs associated with acline twinning.

Biotite (13%) occurs as irregular grains pleochroic from brownish green to pale yellow with pleochroic haloes around zircon.

Other minerals comprise opaque grains (almost 2%) and titanite, apatite, epidote less than 1%.

Aguasabon Lake Batholith

Quartz-poor granitic rocks make up by far the largest part of this batholith. They are mainly grey on the weathered and fresh surface, and massive but locally foliated. Thin section study of a typical sample indicated a quartz monzonite composition as described below.

Quartz Monzonite

A sample from the southeastern part of the mass is massive and medium grained. Quartz could not be easily seen on the weathered surface. The feldspars are grey and are about 2 X 1 mm, and are both rectangular and ovoid. Chlorite is in irregular grains 0.5 X 0.5-1 mm. In thin section the texture is seen to be allotriomorphic granular. The mode of the rock is given in column 2 of Table 25.

Quartz (12%) consists of composite grains with irregular curved boundaries, wavy extinction and occurs interstitially.

The alkali feldspar (36%) is microcline and microcline perthite of the patch variety and occurs as anhedral grains of variable sizes. It is patchily distributed within the rock. Many of the grains show grid twinning but others are untwinned.

The plagioclase (37%) is mostly anhedral, with a few subhedral grains; one is oligoclase (An21). It is patchily sericitized, brownish in places where altered, and has lobate myrmekitic outgrowths into the potassium feldspar. Carlsbad and albite-Carlsbad twinning occur.

Ferromagnesian minerals comprise chlorite (13%) pleochroic in shades of green occurring as flakes and irregular grains.

Other minerals comprise almost square opaque grains of pyrite, grains of hematite, and irregular grains of epidote all in amounts less than 1%.

Archean to Proterozoic

Mafic Intrusive Rocks

Diabase Dikes

Diabase and Quartz Diabase

Diabase occurs as dikes varying from about 8 m to about 91 m wide. There are four trends of diabase dikes in the map area: (1) west-northwest to east-west, (2) north-south, (3) north-east, and (4) northwest.

The west-northwesterly to east-west dikes are the most numerous and are most common along the southern margin of the map-area intruding both volcanic and granitic rocks. They are not as common in the northern part of the map-area. These are black massive, medium-grained, non-porphyritic rocks with a modal colour index of about 40. They are usually well jointed (Photo 14). The weathered surface of these rocks is reddish-brown, the fresh surface is black, and all the specimens examined were moderately magnetic. In thin section these rocks show intergranular ophitic and subophitic textures and comprise plagioclase (labradorite An 56 to An 65) and common clinopyroxene which is usually anhedral, brownish and twinned. The clinopyroxene is commonly marginally altered to greenish-brown hornblende, uralite and yellowish green and green chlorite, and brownish biotite. The plagioclase in places is fresh and in places altered and shows composite twinning comprising Carlsbad, albite-Carlsbad and acline A twinning. Chlorite commonly occurs along the cleavages of the feldspar. Interstitial granophyre occurs in minor amounts and quartz grains were seen in one thin section. Opaque minerals comprise magnetite and ilmenite; some of the latter are skeletal and are altered to titanite and leucoxene. Chemical analyses of five samples (LL 24-8, WW 6-5, RR14-3, VV 6-9, UU 6-1) are listed in columns 1-5 of Table 26 and on the AFM diagram they plot as tholeiitic. The molecular norms of these rocks are listed in columns 1-5, Table 27.

North-trending dikes are not common in the map-area. They are similar in hand specimen to the west-northwesterly to east-trending dikes described above. A sample from one of these dikes about 0.8 km long located 3.5 km east of Ducell Lake in the east-central part of the map-area was examined in thin section. It shows coarse, crudely-developed intergranular texture and comprises altered (saussuritized) plagioclase (too altered for optical identification), brownish clinopyroxene some of which is simply twinned, and marginally altered to brownish green hornblende, irregular interstitial areas of pale green chlorite and serpentine. Opaque minerals comprise elongated and irregular and skeletal grains of ilmenite altered to leucoxene, and grains of pyrite. No difference between the west-northwesterly to east-west dikes and these dikes could be observed in either field characteristics or in thin section. A chemical analysis of these dikes is given in column 6 of Table 26 and its molecular catanorm in column 6 of Table 27. The rock is chemically tholeiitic. Its specific gravity is 2.98 and normative colour index is 40.

Northeasterly-trending dikes are similar in hand specimen to the diabases previously described. In thin section they show intergranular texture and comprise fresh and altered plagioclase (labradorite, An 62), brownish twinned clinopyroxene showing marginal alteration to brownish green hornblende, a brownish biotite, and yellowish-brown and green serpentine. Quartz and granophyre occur as irregular interstitial grains and apatite was observed. Pyrite, magnetite and ilmenite altered to leucoxene and brownish titanite comprise the opaque minerals. Three samples OO 26-3, XX 10-13, WW 13-3 were chemically analyzed, the analyses of which are listed in columns 7, 8 and 9 of Table 26 and their standard molecular catanorms in columns 7, 8 and 9 of Table 27. The specific gravity of these rocks ranges from 3.01 - 3.03, and their normative colour index from 43 to 45. The rocks are all tholeiitic.

Porphyritic diabase occurs in a northeasterly-trending dike located 1.5 km east of Bews Lake at the south-central part of the eastern boundary of the map-area. The porphyritic diabase occurs only locally along the length of the dike. The phenocrysts consist of yellowish crystals of feldspar 5 X 3 mm in dimension.

Feldspathic diabase occurs as a northeasterly-trending dike intruding mafic metavolcanics at mileage 4.5 on the Kimberly-Clark of Canada Limited road. The rock has a modal colour index of about 30 and is made up of reddish feldspars and dark ferromagnesian minerals. In thin section the rock shows coarse inter-granular texture made up of lath-shaped randomly oriented plagioclase and enclosing subhedral and euhedral clinopyroxene altered to uralite and pale green serpentine. Opaque minerals comprise magnetite and ilmenite altered to titanite.

Amygdaloidal diabase occurs as northwesterly trending dikes along the Lake Superior shore and within 1 km of it north of the islands Les Petits Ecrits 3 km east of Worthington Bay. Both dike occurrences are porphyritic, containing euhedral phenocrysts of plagioclase up to 3 mm X 1.5 mm. The amygdules are round 1-2 mm in diameter and are either pale green or white. In thin section the pale green amygdules consist of chlorite only or chlorite enclosing carbonate, but where the amygdules are white they consist mainly of carbonate surrounded concentrically by a narrow rim of chlorite. In both cases the chlorite shows a radial structure. In other amygdules a central spherule of chlorite showing radial structure is rimmed by interfering, smaller spherules of anhedral and brownish chlorite showing radial structure; or a central irregularly-shaped area of granular chlorite is surrounded by radiating chlorite. The amygdules form about 5% of the rock. The absence of radial feldspar in these amygdules suggests that they are not varioles.

Olivine Diabase

Olivine diabase occurs as massive and porphyritic dikes with east-west to west-northwesterly and northeasterly trends in the southern part of the map-area on Schreiber Peninsula and northwest of the islands Les Petits Ecrits at Worthington Bay. The olivine diabase has been described separately from the other previously described diabases but no age difference is implied, as they were not observed to cut the other dikes. Where coarsely olivine-phyric, as in the case of the west-northwesterly dike located about 0.5 km south of Fourth Lake in the central part of Schreiber Peninsula, the olivine diabase can be easily distinguished from the diabase and quartz diabase by the presence of yellowish-green subhedral grains of serpentinized olivine. Where the rocks are non-porphyritic and are medium-grained, as all the dikes are it is not possible to distinguish the olivine diabase except in thin section. Thus some of dikes mapped as diabase and quartz diabase may be olivine diabases.

A thin section of one of the non-porphyritic medium-grained rocks was examined. The rock is black on the fresh surface and reddish-brown on the weathered surface. In thin section the rock shows intergranular and subophitic textures. The plagioclase is fresh and lath-shaped labradorite (An65), the clinopyroxene is anhedral and brownish showing alteration to greenish serpentine. Olivine forms 10% by volume of the rock and occurs as subhedral and anhedral grains altered to yellowish brown serpentine with relict cores of unaltered olivine. Opaque minerals comprise magnetite and irregularly shaped elongated grains of ilmenite. The other example studied (RR 8-111) is a porphyritic rock dark greyish-brown on the fresh surface and brown on the weathered surface. The rock consists of large subhedral greenish crystals of feldspar ranging from 3 X 4 mm to 4 X 6 mm associated with smaller grey feldspar phenocrysts averaging 1 X 2 mm, dark ferromagnesian minerals averaging 2 X 3 mm and emerald-green phenocrysts 5 X 6 mm of serpentinized olivine, in a brown feldspathic matrix. In thin section the rock consists of euhedral and subhedral phenocrysts of brownish clinopyroxene, lath-shaped grains of altered plagioclase feldspar and serpentinized grains of olivine in a coarse intergranular matrix of similar mineralogy. Opaque irregular and skeletal grains of ilmenite are scattered through the rock.

Mineralization

Silver-copper mineralization (Occurrence No. 78) is in an east-northeasterly trending diabase dike located on the shore of Lake Superior 0.5 km northwest of the westernmost island of the Les Petits Ecrits islands about 3 km east of Worthington Bay. The deposit is fully described under the heading Worthington Bay No. 2 Occurrence on of the Economic Geology Section. Assay of the mineralized material which comprised chalcopyrite and pyrite by the Geoscience Laboratories, Ontario Geological Survey yielded 2.76 oz silver per ton and 1.09% copper. This was the only mineralized diabase dike located.

Proterozoic

Sedimentary Rocks

Animikie Group

Gunflint Formation

Sedimentary rocks comprising a basal conglomerate, ironstone, chert, shale, mudstone and limestone lying unconformably on Archean granitic and mafic metavolcanic rocks as discontinuous erosional remnants occur along the shore of Lake Superior from Winston Point to Schreiber Beach in Collingwood Bay and on Flint Island 200 m offshore. These rocks are unmetamorphosed, dip gently from 10-15° to the southwest, and resemble rocks belonging to the Gunflint Formation as described by Goodwin (1956, p.568, 570; 1960, p.49) and Moorhouse (1960, p.7). These rocks are referred to as the Gunflint Formation by the author and specifically as the Lower Gunflint (Goodwin 1960, Table III p. 48, and p.49; Franklin 1970, Table 4, p. 14). The sequence observed is basal conglomerate, overlain by oxide-facies iron formation, shale and mudstone.

Matrix-supported conglomerate about 2 m thick forms the lowest part of the sequence and consists of rounded pebbles 1 - 4 cm in longest dimension of quartz, jasper and mafic volcanic rocks in a dark sandy matrix. This conglomerate rests directly on Archean granite or Archean basalt. No granitic clasts have been observed by the author.

Oxide facies iron formation overlies the conglomerate and occurs as black and grey bedded units consisting of 2.5 - 7.5 cm thick bands of magnetite, dark red hematite, and massive and nodular pyrite in bands up to 7 mm thick, interlayered with bands of grey and black chert. The nodules of pyrite show radial structure when broken across.

Black shale and mudstone overlie the ironstone. In places this unit is 1 m thick. This unit in places is silicified and is then hard and massive. In some exposures massive pyrite in layers 4 mm thick occur parallel to the bedding.

Limestone occurs as yellow-grey massive carbonate in isolated patches or interlayered with the chert. On the shore of Lake Superior northeast of Flint Island, about 6 km southwest of Schreiber, weathered mafic metavolcanics underlie the sediments. This weathered mafic rock has the appearance of a mafic conglomerate consisting of rounded mafic fragments 2.5 - 40 cm in longest dimension set in a fine-grained, rusty indurated matrix of weathered mafic rock where the mafic rock has completely disintegrated to fine grained material devoid of rounded 'clasts'. The material has been described as a regolith by Harcourt (1939, p. 14-15).

Micro-organisms have been described from the chert in this area (Barghoorn and Tyler 1965), and detailed studies of the sedimentary structures and sedimentary environment of deposition of the Gunflint rocks in this area are given by Markun and Randazzo (1980) and Shegelski (1980).

Mafic Intrusive Rocks

Diabase Sills (Logan Sills)

Diabase and feldspathic diabase

Diabase and feldspathic diabase occur in sills in two discontinuous exposures along the shore of Lake Superior between Winston Point and Flat Point and on Flint Island, 200 m offshore where it is intrusive into the Animikie shale.

The diabase is reddish brown on the weathered surface and black on the fresh surface. It varies from fine to medium grained and is massive. Perfectly developed ophitic texture can be seen on some weathered surfaces. The diabase is very fresh in appearance.

Feldspathic diabase was observed in one part of the diabase only on the shore at Flat Point. Pink late-stage primary feldspathic material pervades the rock as irregular masses. The diabase is then leucocratic with a colour index of about 20-30.

Diatreme Breccia

A small exposure of breccia was located in the extreme northeastern corner of claim TB 3411 about 1.5 km northeast of the intersection of Highway 17 and the C.P.R. railroad, 1.7 km west-southwest of Hays Lake. This breccia unit was mapped by Harcourt (1939, p. 10) who described it as an explosion breccia or a partially exposed lens of conglomerate. The outcrop measures about 10 m by 12 m across in an area underlain by mafic and intermediate metavolcanic rocks and ironstone of the upper metavolcanic sequence. The rock is greyish brown on the weathered surface and a polished surface of the rock shows it to consist of angular, subrounded and rounded fragments of dark red jasper 5 X 4 mm to 35 X 5 mm across, cream aphanitic intermediate metavolcanic rocks 15 X 3 mm to 15 X 15 mm across, and grey chert 3 X 4 mm in dimension set in a fine-grained grey matrix of quartz and feldspar. The rock is massive, unfoliated and mineralized with 10% pyrite which occurs as angular grains 3 X 2 mm in the matrix, as a coating 0.5 mm thick on some of the lithic fragments, and as numerous stringers 0.5 mm to 1 mm wide infilling fractures in the fragments. In view of the fact that no other conglomerate or breccia units were located in the area and the rock unit did not form a layered lithologic horizon, the interpretation of the body as a diatreme is the most feasible. Because the rock is undeformed, and consists of rocks occurring in the Archean it is regarded somewhat arbitratrarily, as Proterozoic in age by the writer. A detailed study of this occurrence was made by Sage (1982, p. 4-9) who referred to it as the Gold Range diatreme. An assay of a sample taken from the unit by Sage (1982, p. 8) returned 0.01 ounce of gold per ton from an assay carried out by the Geoscience Laboratories, Ontario Geological Survey, Toronto.

Phanerozoic

Cenozoic

Quaternary

Pleistocene and Recent

Ground moraine till (Zoltai 1965) comprising a mixture of sand and gravel forms a thin discontinuous veneer over the predominant bedrock knobs formed by the outcropping

Precambrian rocks. Boulders are predominantly granitic and well rounded.

Glaciofluvial outwash deposits (Gartner 1979) consisting predominantly of sand occur in the southwestern part of map area; sand and gravel occur at the southeastern end of Whitesand Lake, and at Schreiber; sand, gravel, and boulders occur between Schreiber and Terrace Bay; and sand and gravel occur along various valleys in the south part of the area.

Glaciolacustrine deltaic sand and gravel deposits (Gartner 1979) occur at the mouth of McLean's (Sox) Creek, at the mouth of Whitesand Creek at Selim in the southwestern part of the map area.

Structural Geology

The map-area has been affected by at least one major episode of deformation which folded the supracrustal rocks along east-southeasterly axes, and imposed a pervasive regional foliation best developed in the eastern half of the map-area. This foliation is generally parallel to the trends of the lithological units, but in the neighborhood of the Terrace Bay Batholith this foliation has been deflected to trend parallel to the margin of the batholith representing a second local deformation episode superimposed on the major folding. The p-diagram (Figure 15) for the foliations in the region of the Hays Lake syncline (Figure 17) shows a concentration of poles in the north-northwesterly, south-southwesterly and south-southeasterly directions. When this diagram is compared with the rose diagram (Figure 16) of the primary structural elements of pillow and bedding directions about the fold it can be seen that the foliation directions are parallel to primary features. The concentration of poles to foliation in the south-southeastern corner of the p-diagram shows the influence of the intrusion of the Terrace Bay Batholith on the foliation trends. In this area the margin of the Terrace Bay Batholith trends N 60o E and intrusion has rotated the foliation into parallelism with this trend.

Folding

Folding in the map-area is about an east-southeasterly trending axis. Within the Keewatin type metavolcanic rocks a major synclinal axis trends east-southeast and is located about 0.4 km south of Victoria Lake and passes across the southern part of Big Bruin Lake. On the southern limb of this fold axis the rocks trend southwestwards, and on the northern limb they trend northeastwards. On the basis of these trends and facing data the syncline is interpreted to plunge east-southeastwards. The major conjugate anticlinal structure could not be located but possibly was located in the area now underlain by the Crossman Lake Batholith. The rocks north of the batholith face north and those south of the batholith face south and southeast suggestive that the batholith intruded along the anticlinal axis of this fold. Subsidiary fold axes trending southeasterly and plunging in that direction occur in the region northwest of Hays Lake.

In the Quetico-type metasediments, in the northeastern part of the region, it was difficult to see primary bedding features, but in the few cases observed, it was found that foliation in these rocks also parallels bedding. On the basis of the attitude of this foliation, fold axes are interpreted to trend in an east-west direction. The location of these axes shows that folding in the metasediments of the Quetico Subprovince is tighter than in the metavolcanic rocks of the Abitibi Subprovince, but along the same directions. Within these rocks, in the triangular area between the Aguasabon River and Aguasabon Lake, "S" shaped drag folds were observed with plunges to the north and northeast of 50 and 58 degrees respectively. These are believed to represent minor folds in areas of intense local shear deformation near faults.

Faults and Lineaments

Lineaments with a northwesterly trend are most strongly developed, with a northeasterly trend less so, and the north trend least marked of all. These trend directions are followed by veins and by streams and lakes. On the basis of abrupt terminations and offsetting of lithological units, and shearing of the rocks some of these lineaments are interpreted as faults. On this basis the major northwesterly faults are, from west to east: the Sox Creek Fault and the Cook Lake Fault in the western part of the map-area, and the Harvie Creek Fault and the Aguasabon River Fault in the northeastern part of the map area. The major northeasterly-trending faults are the Schreiber Point Fault with its likely extension the Syenite Lake Fault in the central part of the map area, the Worthington Bay Fault at the southern margin of the central part of the region, and the Ellis Lake Fault in the central part of the map area. The major north-trending fault is the Big Bruin Lake Fault.

Along the Sox Lake Fault, displacement is right lateral. Along the Cook Lake Fault vertical displacement with downthrow on the northeastern side of the fault would best explain observed lithological relationships. The actual nature of movement on the Harvie Creek and Aguasabon River Faults is less clear due to little detailed mapping along the east side of these faults. Along the Schreiber Point and Worthington Bay Faults displacement is right lateral and left lateral respectively. On the Syenite Lake Fault a vertical component of movement is considered by the author to have been very important as a pronounced fault scarp is readily discernible in the field trending parallel to much of the western shore of the lake. Along the west shore of Schreiber Peninsula a fault scarp is apparent along the Schreiber Point Fault with downthrow apparently to the west. If the Syenite Lake Fault and the Schreiber Point Fault are the same, there was probably a scissor movement on this fault with the east side down at the northeast-ern end of this combined fault, and the west side up at the southwestern end. This would help to explain the occurrence of the Gwynne Mountain granitic wedge. Similarly an important vertical component of movement is believed to have occurred with the east side down on the Worthington Bay Fault as a marked but less spectacular fault scarp occurs along the west side of this fault in the Worthington Bay area. Along the north-south Big Bruin Lake Fault a fault scarp was observed with downthrow to the east. The change from mafic metavolcanics to granitic rocks is sharply defined by this fault scarp.

It is believed by the writer that the preponderance of metavolcanic rocks in the eastern two-thirds of the map area is likely due to the existence of a vertical component to the movement on these faults with downthrow to the east resulting in preservation of more volcanic rocks in the eastern part of the map area compared with the west.

Correlation of Geology and Aeromagnetic Data

Aeromagnetic maps 2139G, 2140G, ODM-GSC (1963) cover the Schreiber-Terrace Bay area. Using this map the major lithologic units can, in some cases, be very clearly distinguished from each other.

The areas underlain by mafic metavolcanics are distinguished by more closely spaced contours and by a higher magnetic field than those underlain by granitic or sedimentary rocks. Within these areas large areas of felsic and intermediate metavolcanics can in some cases be distinguished from the mafic metavolcanic rocks. Thus, in the Rhumly Lake area, in the east-central part of the map-area, felsic metavolcanic rocks northeast and southeast of the lake are indicated by aeromagnetic lows, and the large area of intermediate metavolcanic rocks south-southeast of Schreiber, in the south-central part of the map-area can similarly be distinguished from the underlying mafic metavolcanics north of the highway.

The granitic batholiths can be fairly readily distinguished from areas underlain by metavolcanic rocks; for example, the Crossman Lake Batholith can be easily outlined. The Terrace Bay Batholith and the Whitesand Lake Batholith are less readily outlined by their magnetic pattern because these two batholiths have less steep contacts. In the areas underlain by the granitic rocks the aeromagnetic contours are more widely spaced and have lower magnetic values than those associated with areas underlain by the metavolcanic rocks.

Areas underlain by oxide facies ironstone units can be distinguished within areas underlain by mafic metavolcanic rocks, for example, northeast of Schreiber.

The boundary between the Abitibi and Quetico Subprovinces is very clearly delineated on the aeromagnetic map, coinciding closely with the boundary mapped during the current project.

As mentioned above, caution should be exercised in correlating the aeromagnetic patterns with lithologic units. Some areas underlain by mafic metavolcanic rocks or even metagabbro correspond with aeromagnetic lows; for example in the region west of Big Bruin Lake near the central part of the map area, and in the area underlain by mafic metavolcanic rocks along the north shore of Collingwood Bay.

Diabase dikes, though magnetic, cannot be distinguished on the aeromagnetic maps even where they intrude areas underlain by granitic rocks only.

Structural features which can be distinguished on the aeromagnetic map are the major faults. These are expressed by the parallelism of aeromagnetic contours over large distances, narrow aeromagnetic lows, and close spacing of the aeromagnetic contours. In this way the long Cook Lake Fault and much of the Sox Lake Fault can be delineated. However, delineation of the Sox Lake Fault on the basis of magnetic response could not be carried out in areas underlain by mafic metavolcanics. The other larger faults within the map area; for example, the Harvie Creek Fault and the Aguasabon River Fault do not show any aeromagnetic expression.

Correlation of the aeromagnetic map with the major lithologic units shows that certain aeromagnetic anomalies exist which cannot be explained by the results of current geological mapping. Two aeromagnetic highs in the northeastern part of the map area between the Aguasabon Lake and Aguasabon River require investigation. The more southerly of the two is underlain by granitic rocks, and the high magnetic field is regarded as anomalous for such rocks. The area directly under the more northerly of these two aeromagnetic highs was not mapped, but it lies in a region underlain by Quetico metasediments and granitic rocks, which normally show a low aeromagnetic expression. For this reason this aeromagnetic high should also be investigated. Two similarly anomalous areas occur in the western part of the map area: one within the Crossman Lake Batholith centred 0.5 km west of Rhea Lake and the other within the Whitesand Lake Batholith, at the northern part of Sox Lake. Assessment work files show that the Rhea Lake anomaly is associated with a pyrite occurrence.

Economic Geology

History of Exploration

Base-Metal Mineralization

Exploration activity for the location of base metal copper-lead-zinc mineralization was carried out in two areas: along the boundary of the Abitibi and Quetico Subprovinces in the northern part of the map area and within the metavolcanic rocks of the Abitibi Subprovince themselves. This work consisted of geophysical surveys followed by geological mapping and diamond drilling; and was carried out intermittently from 1954 to 1979. In 1954, 1957 and 1979 United Montanban Mines Limited, McPhar Geophysics Limited and Selco Mining Corporation carried out ground electromagnetic work at Heron Lake and Southpine Lake at the northwestern end of the boundary in the map-area and in 1959 Burrex '59 Syndicate carried out ground self-potential and dip-needle magnetic surveys at Graphite Lake near the central part of the Abitibi-Quetico sub-province boundary. Numerous east-trending anomalies were discovered from these surveys and a total of 5 diamond drill holes totalling 417 m (1368 feet) were put down to test them. Mineralization consisting of pyrite, pyrrhotite, sphalerite and galena, massive in places and associated with graphite at Graphite Lake, was encountered. At the eastern end of the Abitibi-Quetico subprovincial boundary Sol Cowan in 1969 carried out ground exploration work, but no results of the work are on record. In various areas within the Abitibi metavolcanic rocks Ellswood Mining Exploration Company Limited in 1957, Kennco Explorations (Canada) Limited in 1971, Hudson Bay Exploration and Development Company Limited in 1973, and Noranda Exploration Company Limited in 1976 carried out geophysical surveys for the discovery of copper-lead-zinc deposits. In 1969 Zenmac Metal Mines Limited carried out a drilling program. In all, 9 diamond drill holes totalling 690 m (2297 feet) were drilled by these companies. Pyrite, pyrrhotite, chalcopyrite, galena and sphalerite mineralization was found.

Copper mineralization

In 1921, 1950 and 1954 surface exploration and diamond drilling were carried out at Ansell Lake in the north-central part of the map-area by persons unknown, East Sullivan Mines Limited and Ascot Metals Corporation, respectively, to test for copper mineralization in metavolcanic rocks. Three diamond drill holes were drilled for a total of 300 m (1000 feet). Mineralization consisting of disseminated and stringer chalcopyrite, pyrite and pyrrhotite was discovered.

Gold Mineralization

From 1896, when gold was first found in the map-area, exploration was almost continuous until 1934 and more recently from 1971 to the present. Gold was explored for in both the metavolcanic rocks of the Abitibi Subprovince and in the Terrace Bay Batholith. This work comprised ground exploration by trenching, pitting, and the sinking of shafts and adits. This resulted in the discovery of five quartz veins on the former Otisse Mining Company property, the largest being 152 m (500 feet) long at the surface, 0.7 to 1.2 m (2 1/4 to 4 feet) wide and trending N45°E; seven quartz veins varying from 134-183 m (440-600 feet) long and 5 cm to 28 cm (2 inches to 11 inches) wide and striking from N30°E to N45°E on the former Gold Range Mines Limited property; one quartz-aplite-pegmatite vein 152 m (500 feet) long and 46 cm (18 inches) wide striking N60°E; and a set of eight parallel quartz veins on the original Harkness-Hays Limited property measuring up to 10 cm (4 inches) wide and striking N43°E, all in the vicinity of Hays Lake in the south-central part of the map-area. North of Hays Lake exploration led to the discovery of fine quartz veins ranging from 15 -30 cm (6 to 12 inches) wide and up to 76 m (250 feet) long striking northwesterly and southeasterly on the former Schreiber Pyramid Gold Mines Limited property; several quartz veins ranging from 5 to 76 cm (2 inches to 2.5 feet) wide and up to 82 m (270 feet) long striking from N50° to N6°W and N65°E comprising the Johnston-McKenna and McKenna-McCann Occurrences of the former Cook Lake Gold Mines Limited property; and the Little Bear Occurrence, a quartz vein 2 m wide and 45 m long striking N 50oW. Two quartz veins were discovered in the granitic rocks; one the McKellar vein, a quartz vein reported to be 2.5 to 46 cm (1 inch -18 inches) wide and 515 m long and with an arcuate east-west trend emplaced in syenitic rocks and intermediate metavolcanics on Schreiber peninsula, and the Gale vein, a 0.8 - 1.2 m (2.5 - 4 foot) quartz vein 305 m (1000 feet) long and striking N 75° E in the Terrace Bay Batholith. Diamond drilling was carried out only on the McKellar vein, comprising ten drill holes of unknown length. Mineralization in the various veins consisted of visible gold associated with pyrite, galena, graphite, chalcopyrite, sphalerite, molybdenite, arsenopyrite and tetradymite. Only one of the veins, the McKellar vein formed a mine, the North Shores Mine which produced 1584 ounces of gold and 179 ounces of silver from 3808 tons of ore milled from 1935 to 1937.

Nickel-sulphide mineralization

Exploration for nickel sulphide mineralization was carried out in two geological environments: pyrrhotite-magnetite deposits in a sulphide facies iron formation unit, and in metagabbro.

In the iron formation unit Iron Lake Exploration Limited in 1948 carried out a dip-needle magnetometer survey in an area 1.6 km west of Schreiber where pitting and driving of an adit had been previously carried out. In the same year the company carried out a similar survey on a similar deposit located 1.8 km south west of Hays Lake, where pitting had also been previously done. In 1965 Tri-J Mineral Surveys carried out a vertical magnetic intensity survey on this occurrence. Both occurrences are located near the south-central margin of the map-area. The exploration appears to have been for nickeliferous pyrrhotite.

Intermittently from 1930 to 1970 diamond drilling, geological mapping, ground magnetometer surveys and pitting and trenching were carried out by Consolidated Mining and Smelting Company of Canada Limited (Cominco), Cook Lake Gold Mines Limited, Falconbridge Nickel Mines Limited, New Athona Mines Limited, Zenmac Metal Mines Limited and Nicohal Mines Limited on an occurrence of pentlandite, chalcopyrite, magnetite ilmenite, pyrite, and pyrrhotite mineralization located in a metagabbro mass enclosed in granitic rocks in the west-central part of the map-area 2.5 km southeast of Lower Ross Lake. A total of 29 diamond drill holes for a total of 2451 m (8,040 feet) were drilled on the occurrence which was reported to consist of a sheeted zone about 76 m (250 feet) long, by 2 m x 6 m (5 to 20 feet) wide, striking N 38° E near the northwestern boundary of the metagabbro. A detailed study of the deposit was carried out by D.T. Anderson (1951) who concluded that the "deposit represents a hydrothermal assemblage of magnetite, ilmenite, pyrite, pyrrhotite, pentlandite and chalcopyrite, the foregoing being the paragenesis of the minerals".

Molybdenum-copper mineralization

From 1937 to 1979 exploration for molybdenite mineralization was carried out in five places within the map-area: at (1) the southwestern end of Owl Lake at the central part of the eastern boundary of the map-area by Zenmac Metal Mines Limited and Pipawa Exploration Limited; (2) 2 km southwest of the southwestern end of Owl Lake at the central part of the eastern boundary of the map-area by Zenmac Metal Mines Limited and Pipawa Exploration Limited; (3) 2 km southwest of the southwestern end of Hays Lake near the south-central margin of the map-area by Nor-Acme Gold Mines Limited and OJA Limited; (4) at Rongie (Ranger) Lake in the south-central part of the map-area 2.5 km northwest of Schreiber by Dickenson Mines Limited; and (5) 3.2 km north-northwest of Sox Lake in the northwestern part of the map-area by Briar-Court Mines Limited, Zenmac Metal Mines Limited and Long Lac Mineral Exploration Limited. These deposits all occur at the margins of granitic batholiths and the enclosing supracrustal metavolcanic and metasedimentary rocks. At Owl Lake exploration activity consisted of pitting and trenching, geological mapping, ground magnetometer surveys, a geochemical soil survey and the drilling of 4 diamond drill holes totalling 159.7 m. Near southwest of Hays Lake pitting and trenching, a ground magnetometer survey, a geochemical survey, an aeromagnetic survey and the drilling of 7 diamond drill holes for a total of 658 m (2159 feet) were carried out. At Rongie (Ranger) Lake one diamond drill hole 154 m (506 feet) long was drilled. At the occurrence northwest of Sox Lake, pitting, trenching, geological mapping, sampling and a geochemical survey were carried out and one diamond drill hole was drilled to a depth of 61 m (200 feet). Mineralization consists of disseminations and stringers of molybdenite and chalcopyrite in quartz-veins, and in aplite and pegmatite veins in granitic rocks at Owl, Hays, and Rongie (Ranger) Lake; and in aplite and quartz veins and migmatized metasediments at the Sox Creek Occurrence northwest of Sox Lake.

Pyrite

In 1897 the Davis Sulphur Ore Company carried out pitting, trenching and the driving of one adit on the Morley Occurrence located in a pyrite-pyrrhotite sulphide facies iron formation unit 2.4 km southeast of Schreiber, for the purpose of extracting sulphur from the pyrite.

Silver Mineralization

Exploration for silver deposits was carried out in the periods 1922-24, 1936, prior to 1969 and 1970-73 on four occurrences, three of which are in calcalkalic intermediate tuff and one in an east-west diabase dike, all located on the eastern half of Schreiber Peninsula southwest of Schreiber.

During 1922-24 a shaft 2.4 m (8 feet) long by 2 m (5 feet) wide by 6.1 m (20 feet) deep was sunk on the Longworth quartz-carbonate vein which intersects an east-west diabase dike located 2.5 km south-southeast of Schreiber. The vein strikes N 20° E and is mineralized with silver, galena, chalcopyrite and pyrite.

In 1936 P.A.L. Exploration prospected the 'Morley' carbonate vein located 500 m northeast of the Longworth Vein, which is mineralized with argentiferous galena and sphalerite. The strike of the vein is N 10°E.

At an unknown time during or prior to 1969 five diamond drill holes of unknown length were drilled on the Downey shear (Worthington Bay No.3 Occurrence) located on the western shore of Worthington Bay, Schreiber Peninsula. The shear is reported (M.W. Bartley and Associates, 1969, AFRO; Canadian Mining Journal 1922a, p. 664; Hopkins 1923, p. 107) to be mineralized with argentiferous galena and sphalerite.

In the period 1970-1973 R.W. Pitkanen and J.E. Halonen carried out blasting, pitting, trenching and stripping on the Singleton-Gray carbonate vein which had been reported by Harcourt (1939, p.27) to be mineralized with galena and silver, and on a silicified shear mineralized with pyrite on the same property.

Character of Deposits

Mineral deposits in the map-area comprise precious metal (gold and silver) deposits, and base metal deposits consisting of molybdenum-copper, copper, nickel-copper and polymetallic base-metal iron - copper - lead - zinc - silver occurrences. Detailed descriptions of these deposits are given in the accompanying section Description of Properties, Deposits and Explored Areas, to which reference is made by numbers given in brackets in this section.

Base-metals (copper-lead-zinc)

Base metal deposits comprising sulphide and oxides of iron with minor chalcopyrite occur as narrow bands interlayered with chert, silicified argillite, carbonatized wacke and graphitic schist. These composite units together define sulphide and oxide iron formation units that are interlayered with the mafic metavolcanics. The most important of these units occurs along Highway 17 at Schreiber and comprises the Ellwood Occurrence (Deposit No. 17) and the abandoned Morley Mine (Property No. 9) where the iron sulphide was formerly mined for its sulphur content. The content of non-ferrous metals in these deposits is small, thus at the Ellwood Occurrence "a representative sample of the mineralization yielded traces of zinc by spectrographic examination and 0.24 ounce silver and 0.06 percent copper on assay" (Regional Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay).

Base metal deposits comprising massive sulphide deposits of copper and zinc associated with clastic interflow sediments and ironstone units interlayered with the mafic metavolcanics occur at the Kenecho Mines Limited property (Property No. 33) about 1 km south-southwest of Big Bruin Lake and at Lamont and

Hollinger Lakes (No. 32). In the occurrence at the Kenecho property, drilling by Zenmac Metal Mines Limited in 1969 revealed massive sulphide mineralization over a 1-foot wide zone assaying 19.2 percent zinc and 4.56 percent copper (Regional Geologist's Files, Ministry of Northern Development and Mines, Thunder Bay). Patchy disseminations and stringers of chalcopyrite, argentiferous galena, and sphalerite associated with pyrite, pyrrhotite and graphite occur within shears and along foliation planes in wackes of the Quetico metasediments at Heron Lake (Property No. 55, Canabel Deposit) near its boundary with the underlying Abitibi metavolcanic rocks, at the western boundary of the northeastern part of the map-area. This deposit may represent relics of a transported volcanogenic massive sulphide deposit, slumped downslope after its formation in the metavolcanics to the south and metamorphosed along with its enclosing sediments. Assay results from diamond drilling done in 1958 by Valmont Mining Exploration Limited returned best assays of 0.67 percent zinc over 0.55 m and 0.20 percent silver over 0.48 m (Resident Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay).

Copper

Copper, as chalcopyrie, occurs as vein-type deposits, in stringers and disseminations in shears in basalt and rhyolite at the Ansell Lake Occurrence (Deposit No. 10). The area is underlain predominantly by tholeiitic basalt with narrow interlayered felsic flows all trending northeasterly. The copper was found to be associated with gold. Assays of the mineralized material yielded up to 1.06% copper and 0.3 ounces gold per ton (Resident Geologist's Files, Ministry of Northern Development and Mines, Thunder Bay). This type of copper mineralization is related to shearing and is not of the massive sulphide volcanogenic type.

Gold

Gold, in places accompanied by silver, occurs in four associations: (1) in mineralized quartz veins and quartz stringers in shear zones and faults in mafic metavolcanic rocks; (2) in quartz veins in shears in mafic metavolcanic rocks within or close to the contact aureole of the Terrace Bay Batholith; (3) in the Terrace Bay Batholith itself in its border zone; and (4) in some interflow ironstone units interlayered within the metavolcanics, as describe below.

Deposits of gold in quartz veins occupying shear zones in mafic metavolcanics (association 1 above) are the Schreiber Pyramid (No. 33), Johnston-McKenna, (No. 23), McKenna-McCann (No. 4), the Little Bear (No. 39) occurrences, and two new occurrences which were located during the current survey: the Aguasabon River No. 1 Occurrence (No. 6) and the Von Lake Occurrence (No. 67). The shear zones follow the prominent northwesterly, northeasterly, and north-south regional fracture directions. The gold is accompanied by chalcopyrite, pyrite, galena, sphalerite and molybdenum. The veins vary in width from 15 cm to 1.5 m and in length from 36.6 m to 152.4 m.

Examples of gold occurrences in shear zones related to the contact of the Terrace Bay Batholith (association 2 above), are the Harkness-Hays (No. 24), the Gold Range (No. 3) and the Derraugh (No. 2) deposits. These are all located within 400 m of the contact of the Terrace Bay Batholith in its contact aureole. Characteristics of deposits of this kind have recently been described by Marmont (1983, p. 40-42). Both the veins and the shear zones parallel the contact of the batholith and the shears are intruded by microgranite, quartz-feldspar porphyry, aplite and pegmatite. The veins vary from 7.6 cm to 45.7 cm in width and are up to about 183 m long. The gold is accompanied by pyrite, molybdenum, galena and gold tellurides.

Examples of deposits in the batholith itself (association 3, above), are the North Shores Mine (No. 11) now abandoned, and the Gale (No. 20) and Worthington Bay No. 1 (No. 70) occurrences. Gold occurs in quartz veins varying from 2.5 cm to 1.2 m in width and is accompanied by chalcopyrite, pyrite, pyrrhotite, galena, arsenopyrite and tetradymite. Other occurrences of gold within the batholith are reported in the literature but they could not be located precisely because of poor location descriptions. The North Shores Mine produced 1,584 ounces of gold and 179 ounces of silver from 3,808 tons of milled ore. A best assay value of 0.16 ounces gold, 3.73 ounces silver and 14.00 percent copper was obtained by C.D. Huston in 1971 from chip sampling from the Gale Vein from the Gale Property (Regional Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay). An assay value of 0.03 ounces gold per ton was obtained by the Geoscience Laboratories, Ontario Geological Survey from a grab sample taken by the Ontario survey party from the Worthington Bay No.

1 Occurrence. A two-stage process is envisioned by the writer for the localization of gold at the aureole and within the border zone of the Terrace Bay Batholith. The first stage results from the concentration of gold in greenschist facies mafic metavolcanics consequent on amphibolite-rank metamorphism occurring to the north of the map-area. Dehydration processes associated with such metamorphism are believed to have transported gold in the mafic metavolcanics southward where the rocks are in the greenschist facies of regional metamorphism. The second stage of concentration was brought about by intrusion of the Terrace Bay Batholith which contact metamorphosed the surrounding mafic metavolcanics to the pyroxene facies of contact metamorphism. The first stage of concentration was not sufficient to produce ore deposits hence their absence from the border zones of the Whitesand Batholith, where evidence of a contact-metamorphic aureole was not observed. The gold deposits associated with the Terrace Bay Batholith could then be considered as contact metamorphic as described by Marmont (1983, p. 40-42).

Association 4 above is exemplified by the abandoned Otisse Mine (No. 41). This is a gold occurrence associated with ferruginous, graphitic sediments interlayered with mafic metavolcanic rocks of the Upper Cycle. The gold occurs in several veins. The most important is a 0.7 to 1.2 m wide and 152.4 m long quartz vein occurring in a shear zone and associated with graphite. The vein is enclosed in mafic metavolcanic rocks, and is mineralized with visible gold, pyrite, galena and graphite. Assays from the vein ranged from 0.20 oz gold per ton to 4 ounces of gold per ton from analyses by the Provincial Assay Office (Harcourt 1939, p.26) and Sylvanite Gold Mines Limited (AFRO) respectively. Deposits of this kind have been described by Macdonald (1983, p. 75-83).

Molybdenum-Copper

Occurrences of molybdenum-copper vein-type deposits are spatially related to the granitic rocks of the Crossman Lake, Whitesand Lake and Terrace Bay Batholiths. They occur at the margins in the case of the first two batholiths, and both at the margins of and within the main mass of the granitic rocks in the Terrace Bay Batholith. The deposits associated with the Crossman Lake Batholith are the Owl Lake (Nos. 48, 49, and 54) occurrences; those with Whitesand Lake Batholith are the Sox Creek (No.27), Halonen (No. 25) and Ellwood (Rongie Lake, No. 17) occurrences; and those with the Terrace Bay Batholith are Pitkanen (No. 48), Univex (No. 66), the Mackenzie (No. 9) and the Aguasabon River No. 2 (No. 7) occurrences. The molybdenite occurs as disseminated blebs, flakes, and rosettes, and the copper as disseminated grains and stringers impregnating quartz veins, aplite, pegmatite, and feldspar porphyry. Deposits of this kind have been studied by Marmont and Colvine (1981, p. 233). In the case of the Sox Creek Occurrence, the molybdenite is associated with a contact migmatite zone, whereas in the other deposits such a zone is absent. The molybdenite is accompanied by pyrite and chalcopyrite. Assay results from mineralized areas obtained from the Assessment Files Research Office, Toronto, and analyses by the Provincial Assayer (Bartley 1939, p.40) and the Geoscience Laboratories of the Ontario Geological Survey range from 0.06-6.4% molybdenum and 0.01-5.52% copper. These molybdenum-copper sulphide deposits are classed by the writer as vein-type deposits and not typical porphyry-type deposits as the sulphides do not occur predominantly as large scale, disseminations in a porphyritic granitic rock and large scale hydrothermal alteration was not observed.

Nickel-Copper

Nickel-copper mineralization occurs as nickel sulphide deposits comprising nickeliferous pyrrhotite, pentlandite and chalcopyrite, associated with magnetite, ilmenite and pyrite in metagabbro and granitic rocks at the Nicoper Occurrence located in the west-central part of the map-area 2.1 km east of the southern end of Lower Ross Lake. The major deposit, occurring in the metagabbro, is a massive sheet-like zone about 91 m long and 1.5 m to 6.1 m thick. The grade of the deposit was calculated to be "about 1.00 percent nickel and 0.3 percent copper over 5 to 15 feet" (Regional Geologist's Files, Ontario Ministry of Natural Resources, Thunder Bay). The occurrence of a similar type of mineralization in the granitic rocks nearby is interpreted by the writer as due to rafting of parts of this deposit into the granitic rocks by granitic intrusion. This nickel sulphide deposit in metagabbro is considered by the author to belong to type AI (i) of Naldrett and Gasparini (1971), i.e. deposits associated with stratiform sills and complexes contemporaneous with eugeosynclinal volcanism in orogenic belts.

Silver

Silver, associated with gold and copper, occurs in the map-area as vein-type deposits in two settings: (1) with massive argentiferous sphalerite and galena and chalcopyrite in quartz and carbonate veins in fractures and mineralized shears in calcalkalic rocks in the lower volcanic sequence southeast of Schreiber, and (2) as native silver with massive pyrite and chalcopyrite in diabase dikes.

Three occurrences were reported for the first type: the Morley Vein (Property No. 9), the Singleton-Gray Vein (Property No. 26) and the Downey Occurrence (Property No. 11). They are all located in the eastern half of the Schreiber Peninsula in fractures in calcalkalic andesites and dacites. A grab sample of material from the Morley Vein yielded "5 ounces of silver and 0.53 ounces gold" (Harcourt 1939, p. 26). No assays were available from the other veins.

Two deposits of silver occur in diabase dikes. One is the Longworth Vein (Property No. 9) located in the east half of the Schreiber Peninsula about 3 km south-southeast of Schreiber. The other is a new occurrence located during the current survey, the Worthington Bay No. 2 Occurrence (Deposit No. 71). These occurrences are believed by the writer to be representative of Proterozoic silver mineralization associated with diabase dikes. In the Longworth Vein, the silver was reported (Canadian Mining Journal 1922b, p.682) to occur as native in leaf and nugget form associated with massive galena, visible gold, pyrite and chalcopyrite in quartz and carbonate veins. Assays of the mineralization ranged from 50-350 ounces silver per ton (Canadian Mining Journal, 1924, p. 1018). In the Worthington Bay Occurrence, mineralization comprises pyrite and chalcopyrite and a grab sample taken during the current survey yielded 2.76 ounces of silver per ton and 1.09% copper on analysis by the Geoscience Laboratories, Ontario Geological Survey.

Description of Properties, Deposits and Explored Areas

Walter Acker (1)

In 1981 Walter Acker held two contiguous unsurveyed and unpatented claims 3 km east of Schreiber and 1.3 km east of Lamont Lake. The claims were still in good standing on 31st December 1981.

No exploration work is recorded for the area but current mapping shows it to be underlain by mafic and intermediate volcanics intruded by a small plug of quartz-feldspar porphyry.

Walter Acker (2)

(Derraugh Prospect)

In 1980 Walter Acker held a group of four contiguous claims two of which TB 221713 and TB 221714 are surveyed, leased claims. The property is located about 3 km northwest of Terrace Bay near the northeast shore of Hays Lake. This property formed all or part of the original property of the Derraugh Exploration Syndicate which was later purchased by Jedder Gold Mines Limited in 1936. The property was in good standing on December 31st 1980.

Exploration work consisted of stripping by the Derraugh Exploration Syndicate and diamond drilling by Jedder Gold Mines Limited. No record of the drilling is available, but results were said to be discouraging. During the period 1970-1980, W. Acker of Schreiber, Ontario, carried out trenching and stripping. In 1980 Acker erected a crusher at the eastern end of the vein, and vein material was crushed and shipped for assaying. No results of the assays are available (personal communication, W. Acker 1980).

The author's mapping has shown a shear zone in basalt striking N 60°E intruded by quartz vein material, aplite, pegmatite and quartz-feldspar porphyry extending over a length of 152 m and width of 46 cm. The quartz occurs as lenses, stringers and larger masses as much as 36 cm wide. The basalt host rock is foliated locally at the contact with the vein. The quartz is mineralized with up to 5% disseminated pyrite, chalcopyrite and galena.

Surface sampling of the vein in 1937 by Jedder Gold Mines Limited "was reported to have indicated a 500-foot section averaging 0.23 ounce gold per ton over an average width of 1.5 feet" (Harcourt 1939, p. 23). A chip sample across 36 cm (14 inches), and a grab sample, both taken from the vein by G.A. Harcourt in 1936 and assayed by the Provincial Assay Office, gave 2.19 and 1.31 ounces gold per ton respectively (Harcourt 1939, p. 23). A grab sample taken from the vein during the 1980 survey and analyzed by the Geoscience Laboratories, Ontario Geological Survey, gave 0.45 ounce gold per ton. A sample of mill concentrate, which excluded free gold that had been handpicked, was obtained in 1981 by S. Marmont from W. Acker and analyzed by the Geoscience Laboratories, Ontario Geological Survey. It returned 14.15 ounces of gold and 1.10 ounces of silver per ton (Marmont and Colvine 1981, p. 232).

Walter Acker (3)

(former Gold Range Mine)

In 1980 Walter Acker held surveyed, patented claim TB 3326 located about 1 km west of the southwestern corner of Hays Lake. This claim was originally held as a patented claim by W.S. Jackson in 1921 as one of the Jackson-Russel claims. It later became part of the property of Jackson Development Company. This property was then taken over by Gold Range Mines Limited which was incorporated in 1934. In 1940 Rolac Mines Limited acquired the property of Gold Range Mines Limited. This company had its mining rights forfeited in 1952 and its Ontario charter cancelled in 1953. Its surface rights were forfeited in 1973. The claim was acquired by Walter Acker in 1969 and was in good standing on December 1980.

The following description of early work is a summary from the Resident Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay. Exploration activity in 1919 on the claim by W.S. Jackson resulted in the location of several narrow, rich, gold-bearing quartz veins. This was followed by pitting and the driving of a 30-foot (9 m) northeasterly-trending tunnel, later known as the No. 1 adit, into the hillside on what became known as the No. 1 vein sometime about 1921. By 1936 a 25-foot deep shaft was sunk on a 3" (8 cm) wide vein near the south-eastern corner of the property. By 1937 three adits had been driven into the hillside onto the veins at an elevation of 40 feet (12 m) above the C.P.R. tracks with 100 feet (30 m) crosscutting and drifting being done in that year. The No. 1 adit located at the southwest boundary of the claim was driven northeastwards for about 85 feet (26 m) on Vein No. 1. The No. 2 adit, 400 feet (122 m) northeast of No. 1 adit was driven northwards into the hillside for about 140 feet (43 m) to intersect the No. 2 vein. The No. 3 adit, located about 200 feet (61 m) northeast of No. 1 adit, between adits 1 and 2, was driven westwards into the hillside for about 80 feet (24 m) with 45 feet (14 m) of drifting on the No. 2 vein which it intersected. Four test pits were put down in the sandy area in the southern part of the claim apparently in 1936. A shipment of 70 pounds (32 kg) of ore was made for flow-sheet testing and gold recovery tests from the No. 2 vein in 1936. A small test mill was used on the property for sampling the ore and camp buildings were erected. In 1937 operations were suspended. In 1939 three of the veins were sampled by Sylvanite Gold Mines Limited but without further development. In 1970 surface exploration was carried out by R.W. Pitkanen. The deposits consist of seven parallel to subparallel quartz veins some of which formed parts of discontinuously exposed veins enclosed in mafic metavolcanics. Strike varied from N 30° to N45°E and dip varied from 70-75° NW. Their lengths ranged from 122 m to 183 m (400 to 600 feet) and their widths varied from 5 cm to 28 cm (2 to 11 inches). The veins were mineralized with pyrite, chalcopyrite, molybdenite, galena and gold tellurides. Gold was observed by the writer in grains of pyrite 0.25 mm in longest dimension from polished slabs. Native gold was reported in the quartz veins (Harcourt 1939, p. 22). These veins occur in mafic metavolcanic rocks at the contact with granitic rocks of the Terrace Bay Batholith.

During the current survey apophyses of pink microgranite and quartz-feldspar porphyry were observed to be intrusive into the mafic metavolcanics in the neighborhood of the veins. The No. 2 vein is cut by a later northwesterly-trending diabase dike and a westerly-trending mauve biotite lamprophyre.

Assays were carried out on samples from some of the veins and test pits in the sand by the owners of the property. In 1936 Allis Chalmers Manufacturing Company Mining Laboratory assayed vein material taken by an unknown type of sampling from No. 2 vein for flow-sheet testing and obtained a value of 6.99 ounces of gold per ton. Sylvanite Gold Mines Limited sampled the veins on the property in 1939 and a channel sample taken in the No. 3 tunnel from the No. 2 vein assayed 0.49 ounce gold per ton across 10.9 inches (27.7 cm) for a length of 25 feet (8 m). This vein is 3" (8 cm) to 11" (28 cm) wide as reported by Sylvanite Gold Mines Limited. The sulphide content of the vein near the entrance to the adit was 20% as observed by the author. In 1980 grab samples taken from the No. 2 vein by K.G. Fenwick (Manager, Mineral Resources Division, Ministry of Northern Development and Mines, Thunder Bay) and the author assayed 25.82 and 7.60 ounces of gold per ton respectively on analysis by the Geoscience Laboratories, Ontario Geological Survey, Toronto.

Walter Acker (4)
(former McKenna-McCann Mine)

In 1980 Walter Acker held an unsurveyed unpatented claim which enclosed patented claim TB 1288 held by the patentee J.A. Dunbar. This claim formed part of the former McKenna-

McCann property of Cook Lake Gold Mines Limited which was incorporated in 1936. The claim was in good standing on December 31st 1980.

Exploration work done by the company which commenced in 1937, consisted of stripping and trenching on eleven vein segments which together comprised 4 parallel, discontinuously exposed, northwesterly-trending quartz veins in mafic metavolcanics, and the sinking of a two compartment shaft to a depth of 125′ (38 m) on a vein designated as No.8, by the end of 1938. Lateral work of an unreported extent was carried out at the 125′ (38 m) level. During the period 1972-1977 Walter Acker carried out trenching, stripping and the dewatering and repairing of the shaft.

The occurrences consist of eleven quartz veins segments which are considered to comprise four parallel discontinuously exposed veins fully described by Harcourt (Harcourt 1939, p. 25) when the veins were being explored. The average strike of the veins is N 50°W and the dip varies from 65°-70°SW. The veins are in mafic metavolcanic rocks and a 3-foot (0.9 m) biotite lamprophyre dike was found to cut across the southeastern end of the mineralized zone (Harcourt 1939, p. 25). The veins vary in width from stringers to 24 inches (0.61 m) and the overall length ranges from about 120 feet (37 m) to 270 feet (82 m). Mineralization consisted of pyrite, chalcopyrite and galena, and fine native gold was reported present (Harcourt 1939, p. 25).

Assays from the veins were carried out by Cook Lake Gold Mines Limited in the period 1936-1937 and the Ontario Geological Survey in 1980. The best assay obtained by Cook

Lake Gold Mines Limited was 0.538 ounce gold per ton over 1.13 feet (0.34 m) for a length of 130 feet (40 m) from the No. 10 vein in the vicinity of the lamprophyre dike (Harcourt 1939, p. 25). A 5-ton bulk sample from this vein gave 1.13 ounces gold per ton (Harcourt 1939, p. 25). A grab sample taken from one of the veins during the survey by the Ontario Geological Survey and assayed by the Geoscience Laboratories gave a value of 0.21 ounce gold per ton.

J. Ages (5)

In 1979 J. Ages held one patented surveyed claim TB 7242 on the southwestern shore of Walker Lake, 2.5 km northwest of Schreiber. The claim was in good standing on Dec. 31st 1979.

No exploration work is filed for the claim but current mapping shows that the entire claim is underlain by hornblende-biotite granitic and syenitic rocks.

Aguasabon River No. 1 Occurrence (6)

This occurrence is not staked and lies one kilometre west of Mile 4 on the Kimberly-Clark of Canada logging road. It was discovered by members of the Ontario Geological Survey field party and consists of a shear about 0.3 m wide impregnated with quartz in mafic metavolcanic rock. The shear appears as a photo-lineament 400 m long. The strike of the shear zone is N 40°E and the dip is 70° SE. The quartz is mineralized with 20% disseminated pyrite. An assay of the mineralized quartz carried out by the Geoscience Laboratories, Ontario Geological Survey returned a value of 0.01 ounce gold per ton.

Aguasabon River No. 2 Occurrence (7)

This occurrence is located on Mineral Location No. 1 at Terrace Bay on a patented parcel of land owned by J.L. Nuttal at the mouth of the Aguasabon River. During the survey of 1980, a rusty quartz vein 10 cm wide and striking north-northeasterly was found on the northern of the two islands in the mouth of the river, in a fault zone in hornblende granitic to tonalitic rock. The quartz is mineralized with pyrite and disseminated molybdenite. An assay of the mineralized vein carried out by the Geoscience Laboratories, Ontario Geological Survey returned a value of 0.48% molybdenum sulphide.

Albert Alcorn (8)

In 1979 Albert Alcorn held a surveyed patented claim TB 7240 at the southwest corner of Walker Lake. The claim was in good standing on December 31st 1979.

No exploration work is on file for the property. It is underlain by mafic to felsic metavolcanic rocks and metasediments. Members of the field party mapped prospect pits located in the southeastern corner of the property in metasediments and intermediate and mafic metavolcanics mineralized with pyrite and pyrrhotite. The mineralization consists of disseminated, massive, stringer and nodular pyrite in a shear zone 2 m wide and about 10 m long as exposed, striking N 80° W and dipping 85° northeast. A grab sample taken from one of the pits and analyzed by the Geoscience Laboratories, Ontario Geological Survey yielded 20 ppm copper, 24 ppm nickel and 38 ppm cobalt. The sample was not assayed for gold or silver.

T.C. Armstrong (9)

In the period 1979-1980 T.C. Armstrong held 6 surveyed, patented claims numbered R 606, R 608, R 609, R 610, R 660 and R 665, five of which: R 606, R 608, R 609, R 660 and R 665 form a contiguous block of claims located 2.5 km south-southwest of Schreiber, and the sixth, R 610, is located on the north shore of Lake Superior 4.5 km south-southeast of Schreiber. This property comprised the former Morley property and the former property of the Davis Sulphur Ore company in 1897. The claims were all in good standing on December 31st 1980.

There are three deposits located on the property: the former Morley Mine, the Longworth Vein and the McKenzie Vein.

The Morley Mine (Past Producer)

This is located on claim R 606 in the north-eastern corner of the claim block. This claim was formerly held by a Mr. Morley who sold it to the Davis Sulphur Ore Company in 1897. Exploration work by the company was begun in that year, and consisted of pitting, trenching and the driving of adits. The major excavation was a trench about 150 feet (46 m) long, 10 feet (3 m) wide and about 12 feet (4 m) deep cut on the main occurrence of massive interlayered pyrite, pyrrhotite containing minor chalcopyrite, chert and argillite. An adit was commenced twenty-five feet (8 m) below this trench to test the width of the deposit which was described by E.L. Fraleck (Fraleck 1907, p. 177):

> "Twenty-five feet to the east and farther down the hill a shaft has been sunk on a parallel lens. The shaft was filled with water, but judging from the quantity of material on the dump, would be about sixty feet in depth. The pyrite runs almost the theoretical percentage, but the major part of the dump is composed of pyrrhotite and intermixed pyrrhotite and rock. One hundred feet below, towards the bottom of the gully, a tunnel twenty feet in length has been driven into the hill to the east, with a cross-cut thirty feet in length, disclosing a very lean mixture of pyrrhotite and rock. One quarter of mile to the north test pits have been sunk on some stringers of pyrite, the extent of which it was impossible to ascertain owing to the thoroughness of the weathering".

During the current survey an adit was found located 150 m northwest of the main occurrence, driven west-southwesterly into the bank of the creek. Although partly filled with water, chert and limonite could be observed. Also, 0.4 km southeast of the main occurrence a trench 3 m long by 1 m wide was observed in massive pyrite and chalcopyrite, associated with sugary quartz.

Examination of the main occurrence by the author during the present survey showed it to be a massive, layered, sulphide body consisting, successively from west to east, of massive and brecciated pyrrhotite containing minor chalcopyrite, pyrite, chert and argillite. The strike of the deposit, considering the deposits in the adit to the north and the trench to the south to be the same body, is N 45°W, and the dip, observed in the main showing, is 70°E. Overlying the argillite and grading into it is wacke. The footwall of the deposit at the main showing is grey-cream quartz porphyry. The wacke unit, in which the sulphides occur at the base is overlain by basalt. The overall length of the deposit, including the occurrences at the adit and the trench to the southeast is 0.6 km and the width is 2 m. Both the pyrrhotite and pyrite bodies are 1 m wide. The deposit is terminated to the southeast by the Worthington Bay Fault. It is probable that the faulted extension of this body occurs to the east-northeast at the Downey Occurrence (No. 48).

A trial shipment of mineralized material was shipped by the company in 1897 for the manufacture of sulphuric acid, and the quality of the material for this purpose was reported to be satisfactory. Only the pyrite was used. Considerable amounts of pyrite and pyrrhotite were observed at the dump on the showing during the present survey. No assays of the material are available in the files but a grab sample taken from the trench to the southeast of the main deposit during the current survey and analyzed by the Geoscience Laboratories, Ontario Geological Survey, Toronto yielded 0.03% copper and 0.01 ounce gold per ton.

Longworth Vein

This vein is located in the southwestern corner of claim R 606. It was not relocated during the current survey but an account of it was given by Harcourt (1939, p. 26):

> "On claim R. 606 about 1 1/2 miles south of Schreiber a fracture strikes N 10°E. across an altered rhyolite agglomerate. The fracture, which has been stripped for 225 feet, is occupied by a vein composed of calcite, bands of massive sphalerite, galena, and chalcopyrite. The vein has a maximum width of one foot and pinches out at each end. A grab sample of the material assayed 5 ounces silver and 0.53 ounces gold. During the summer of 1936 the P.A.L. Exploration Company prospected in the vicinity of this occurrence."

McKenzie Vein

This vein is located in the northern part of claim R 660, about 3.5 km south-southeast of Schreiber. The vein could not be relocated during the current survey. It was referred to by Hopkins (Hopkins 1922, p. 23): "Considerable chalcopyrite occurs in narrow quartz veins with molybdenite and other minerals in the McKenzie claim (R 606) southeast of Schreiber ......" Hopkins went on to say that it occurs in "red hornblende granite and syenite" (Hopkins 1922, p. 23). The vein is shown on map No. 30a (Hopkins 1922). The trend of the vein is about N 70°W and is shown with a shaft on it. Current mapping shows the area to be underlain by granitic rocks of the Terrace Bay Batholith within 2000 feet (610 m) of the contact with intermediate metavolcanics. The area is covered with sand deposits. There is no other reference to the vein in the files.

Ascot Metals Prospect (10)

In 1954 Ascot Metals Corporation Limited held a group of 39 unpatented claims at Ansell Lake in the central part of the map-area. This area was formerly held under option in 1950 by East Sullivan Mines Limited. The claims were not in good standing on December 31st 1981.

In 1921 surface exploration work done by unknown concerns led to the discovery of copper occurrences 0.75 km northeast of Ansell Lake. A geological survey was carried out by the then property owners, East Sullivan Mines Limited in 1950, by which time eight occurrences of mineralization had been discovered. The most important showing, the No. 7, was a three-foot wide shear in basalt containing quartz veins. The strike of the shearing was N 80°E and the dip 75°SE. Mineralization consisted of disseminated and stringer chalcopyrite, pyrite and pyrrhotite. In 1954 Ascot Metals Corporation drilled three diamond-drill holes totalling about 1000 feet (300 m) on this occurrence.

Assay of a grab sample taken from the main deposit by East Sullivan Mines Limited in 1950 yielded 1.06 percent copper across a 47-foot (14 m) width from trenching (Resident Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay). Assays of 0.6 percent copper, 0.3 ounce gold per ton, and no nickel were obtained from a 10 foot (3 m) section of drill core from this main deposit by Ascot Metals Corporation in 1954 (Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay).

Autotrack Limited (11)

(former North Shores Gold Mine)

In 1980 Autotrack Limited held a block of five contiguous patented claims numbered: Loc. No.1, Loc. No. 2, BJ 122, BJ 123, TB 3719 at the southwestern part of the Schreiber Peninsula at Worthington Bay. This property contains the original claim BJ 122 which was held by Peter McKellar, surveyed in 1898, and patented by him in 1903. In 1920 it was optioned to W.L. Longworth, and in 1933 North Shores Gold Mines Limited, renamed North Shore Mines Limited in 1936, was formed to work the property. In 1939 R.W. Phelps apparently acquired the property. In 1960 it was purchased by Trio Mining Exploration Limited; in 1969 it was apparently held by G.W. Phelps. In 1973 the Ontario Charter of Trio Mining Exploration Limited was dissolved. The property was in good standing on December 31st, 1979.

There are two deposits on the property: the North Shores Mine and the Downey Occurrence.

North Shores Mine

The following account is a summary taken from assessment work files at the Resident Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay; Hopkins (1922); and Harcourt (1938).

Exploration activity consisting of pitting, trenching and tunneling, began in 1898 when gold was first discovered on claim BJ 122 by Peter McKellar. Between then and 1935, when production began, 14 veins were discovered, one of which, from which gold was produced, was called the Main Vein. This vein is an auriferous quartz vein from 1 to 18 inches wide (3 cm to 46 cm) wide and was about 515 m long, terminated at both ends by faults and hosted in intermediate metavolcanics and hornblende syenite. The trend of the vein is N 80°W with a dip of 55° to the south. Hopkins (1922) reported that the vein occupies a fracture in hornblende syenite and felsic and intermediate metavolcanics. It was mineralized with visible gold, pyrite, chalcopyrite, pyrrhotite, galena, arseno-pyrite and tetradymite. "A channeled sample across eighteen inches of quartz in which no gold could be seen, gave, on assay $40.00 in gold per ton" (Hopkins 1922, p.13, gold at $22.69 per ounce, 1921 price). Development work on the Main Vein consisted of the driving of adits and diamond drilling. The underground work consisted of workings on three levels and one sub-level. Three adits were driven on the vein system. The No. 1 adit was driven westerly on the eastern end of the vein to form the second level, for a distance of 1100 feet (335 m) at an elevation of 975 feet (297 m). One hundred feet of cross-cutting were driven from the adit which followed the vein for a total length of about 550 feet (168 m) at three points. At 2 of these points small stopes 240 feet (73 m) and 140 feet (43 m) long had been started and carried to a vertical height of about 35 feet (11 m). A 15-foot (5 m) winze had been sunk on the vein, 15 feet (5 m) from the portal of the adit and two shallow shafts about 50 feet (15 m) south of the portal were sunk. The No. 2 adit was located at the western end of the vein, about 1800 feet (549 m) west of the No. 1 adit, and at an elevation of 1150 feet (351 m) forming the first level. It was driven eastwards onto the vein for a distance of 700 feet (213 m), and two stopes were made, one for a vertical distance of 80 feet (24 m) to the surface.

From this first level a 130-foot (40 m) winze inclined at 27o west was sunk to a lower level called the sub-level, at an elevation of 1100 feet (335 m), 50 feet (15 m) vertically below. This sub-level was 250 feet (76 m) long and partly followed the vein. From this sub-level ore was stoped for a distance of 175 feet (53 m) mining out all the ore. A third adit, No. 3 adit, located 250 feet (76 m) south of the No. 2 adit and 100 feet (30 m) below it, was driven northeastwards into the hillside onto the vein to form the third level. It followed the vein for 200 feet (61 m) in an easterly direction. The portal of this adit was thus at an elevation of 1050 feet (320 m) forming a level at this horizon on the vein. It was connected by a raise to the 1100 foot (335 m) sub-level. Because of the presence of a fault beneath the sub-level this work was unsuccessful and was abandoned after about 400 feet (122 m) of lateral development. Diamond drilling in 1939 consisted of 10 diamond drill holes by P.A.L. Exploration Limited into the vein to test its persistence at depth. The total length drilled was in excess of 2200 feet (671 m) and the Main Vein was intersected at 180 feet below the first level and the occurrence of gold at depth was confirmed.

Production of gold began in 1935 following the installation of a 25-ton mill by North Shores Gold Mines Limited in 1934 at Worthington Bay on the shore of Lake Superior. Hand-sorted ore was trucked from the adits to the mill where the gold was recovered in an amalgam and a heavy concentrate. Production ceased in 1937 by which time 3,808 tons of ore were milled yielding 2,441 ounces of gold and 226 ounces of silver. Recovery of gold averaged 0.64 ounces of gold per ton of ore milled.

Worthington Bay No.3 Occurrence

On the western shore of Worthington Bay near its northwestern corner, a shear-zone 5 m wide striking N 70° W and dipping 15° SE was observed by the field party cutting grey aphanitic intermediate metavolcanics in a narrow indentation on the shoreline. The zone is mineralized with 30% disseminated pyrite and minor chalcopyrite. Malachite staining can also be observed. A grab sample taken during the survey and analyzed by the Geoscience Laboratories, Ontario Geological Survey, showed 33 ppm copper and 24 ppm cobalt. This occurrence is believed to be the deposit examined by M.W. Bartley and Associates Limited in 1969 and which was described by him as follows:

> "Mr. C.S. Downey of Schreiber, Ontario discovered a narrow occurrence of argentiferous galena and sphalerite in a yellowish rhyolitic formation at the water's edge of Worthington Bay. The yellowish rhyolite is distinctive and appears to be the only host for the sulphide mineralization. Whether it is a dike or flow within a brecciated rhyolite complex is not known.
>
> "Where exposed, the sulphide mineralization has a maximum width of ten inches and is composed of very narrow stringers of massive sulphides separated by apparently barren rock. The mineralization has not been traced along strike successfully.

> "Five shallow diamond drill holes were sunk on the occurrence to determine continuity and dimensions. Because of extreme brecciation core recovery was less than 60%. The only intersection of massive sulphides occurs near the collar of drill hole No. 1. The sections where core was not recovered may represent mineralized zones but this is conjectural.
>
> "Assays of sludge samples and some core sections returned low values, well below ore grade. The unsampled core, with the exception of the narrow section in Hole No. 1, is characteristically barren. Sporadic disseminations of fine sulphide mineralization were noted in the remaining core but the quantity is insufficient to be classed as ore material" (Resident Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay).

These drill holes were not located during the current survey, and no property map of the deposit was available, but the location of occurrence is shown on a geological sketch map of part of the Schreiber area by Hopkins (1923, p.106).

A. Bourguignon (12)

In 1979 A. Bourguignon held one patented claim E. 196 located 1.2 km south-southeast of Schreiber. The claim was in good standing on December 31st 1979.

No exploration work is filed for the claim but current mapping has shown it to be underlain by granitic rocks and intermediate metavolcanics.

Sol Cowan (1969) (13)

In 1969 Sol Cowan held two contiguous unsurveyed and unpatented claims located in the north-eastern part of the eastern half of the map-area. These claims were located near the western shore of the middle part of Owl Lake. Only one of the claims occurred in the map-area. The claims were not in good standing on December 31st 1981.

Exploration work was carried out in 1969 and 1970 and consisted of stripping, pitting and trenching (Resident Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay). No report on the work is on record but current mapping has shown that the exploration was carried out within granitic rocks at the contact of these rocks and Quetico metasediments. No mineralization has been reported. However, the area is shown to be underlain by iron formation on the map of the Cairngorm Lake Area (Walker 1967). Molybdenum - copper mineralization was encountered to the east, associated with pyrite and pyrrhotite.

C.S. Downey (14)

In 1980 C.S. Downey held two contiguous patented claims TB 3973 and TB 6172, 2.4 km east-southeast of Schreiber, south of the highway at Lamont Lake. The claims were in good standing on December 31st, 1980.

No exploration work is on file for the claims but current mapping shows that they are underlain by mafic metavolcanic rocks.

J.A. Dunbar (15)

In 1980 J.A. Dunbar held one patented claim TB 12881 2 miles northeast of Schreiber at Hollinger and Von Lakes. This claim is enclosed by an unsurveyed claim in good standing held by W. Acker, on which was the former Cook Lake Mine. Accordingly the property is described under Walter Acker No. 4. The claim was in good standing on December 31, 1980.

Ellis Lake Occurrence (16)

This consists of a small lens of greenish-black, fine-grained basalt occurring as a xenolith in pink coarse-grained hornblende syenite and was located during the current survey, close to the Ellis Lake Fault. The basalt was submitted for gold assay to the Geoscience Laboratories, Ontario Geological Survey and was found to contain 0.01 ounces of gold per ton. No exploration activity was found in the area. The sample was submitted for assay as it was close to a major fault.

Ellwood Occurrence (17)

In 1957 Ellwood Mining and Exploration Company Limited held a group of 11 unsurveyed claims near the south end of Walker Lake about one mile west-northwest of Schreiber. These claims were not in good standing on December 31st, 1979.

A molybdenum deposit occurs on the northwestern part of the claim group. It was reported to be a quartz vein 1.2 m wide striking N 52 E and mineralized with pyrite, pyrrhotite and occasional flecks of molybdenite and chalcopyrite (Resident Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay). The dip was not recorded. The vein occurs in felsic to intermediate volcanic rocks 40 m from a contact with syenitic rocks. No assays of the mineralization are available.

Fenning Development Corporation (18)

In 1980 Fenning Development Corporation held three contiguous patented claims numbers TB 3917, TB 3937 and TB 4061, located 3.2 km south-southeast of Schreiber. The claims were in good standing on December 31st, 1980.

No exploration work is on file for the claims but current mapping shows that they are underlain predominantly by granitic rocks, with a minor amount of intermediate metavolcanics in the northwest corner. The claims themselves are covered by sand deposits. A chemical analysis of material from a pyrite deposit, the Longworth Pyrite Deposit, from claim TB 3917 or TB 4061, yielded:

	%
Iron	44.63
Phosphorus	0.004
Manganese	0.04
Silica	4.15
Aluminum	0.17
Sulphur	48.60
Titanium	0.41
Loss on Ignition	24.75

(Resident Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay). The deposit was not located during the current survey, and no map showing the location of the deposit exists in the assessment work files.

The discovery of the deposit and nature of the sampling is unknown.

D.A. Figliomeni (19)

In 1979 D.A. Figliomeni held two contiguous patented claims, numbers TB 37565 and TB 37566, centred about .5 km northwest of Schreiber straddling Highway 17. The claims were in good standing on December 31st, 1979.

No exploration work is recorded for the property but it is underlain (in stratigraphic order) by intermediate metavolcanics, a sulphide ironstone unit and basalt. This sulphide ironstone unit has been the focus of exploration for massive-sulphide base metal deposits to the west of the property.

D.E. Gale (20)

In 1980 D.E. Gale held three patented claims numbers TB 3841, TB 3869 and TB 3870 about 3 km southeast of Schreiber. One of the claims TB 3870 was formerly owned by the Fenning Development Corporation in 1922, when it was purchased from L.H. Estelle. In 1924 Western Ontario Mines Limited acquired the property, and by 1971 it was held by D.E. Gale. The claims were in good standing on December 31, 1980.

Exploration work was carried out on claim TB 3870 by Fenning Development Corporation which began in 1922 or early 1923 with the sinking of a steeply inclined 5′ X 10′ (2 X 3 m) two-compartment shaft on a quartz vein. This work was continued by Western Ontario Mines Limited, from 1924 to 1926, by which time the shaft was sunk to a depth of 255 feet (78 m). Underground development work consisted of approximately 525 feet (160 m) of crosscutting and 190 feet (58 m) of drifting on a level set up at 240 feet (73 m) on the shaft. No further exploration work was recorded on the property. Trenching had also been carried out on the vein. In June 1971 a detailed geological survey and a sampling program were carried out by C.D. Huston. The samples were then assayed for gold, silver and copper.

The vein was described by C.D. Huston, consulting geologist, as a quartz fracture zone varying in width from 2.5′ (0.76 m) to 4.0′ (1.2 m) and was 1000 feet (300 m) long at the surface. Its strike is N 75°E and the dip is 80°S. The vein is enclosed entirely in pink, massive, medium-grained hornblende syenite, and was reported to be mineralized predominantly with massive chalcopyrite with minor fine galena and pyrite. The results of chip sampling of the vein by C.D. Huston in 1971 gave a best assay of 0.16 ounces Au and 3.73 ounces Ag per ton over 4 feet (1.2 m) and 14% copper over 4 feet (1.2 m). This sample was taken from vein material at the shaft at surface.

This occurrence was not located during the current survey.

A.J. Garrity, Estate (21)

In 1979, the estate of A.J. Garrity, held two contiguous patented claims numbers TB 4876 and TB 4878 located at Collingwood Bay about 2.5 km southwest of Schreiber. The claims were in good standing on December 31st, 1979.

No exploration work is on file for the property. Current mapping shows the property is underlain by mafic and intermediate metavolcanics and granitic rocks. The Schreiber Fault passes diagonally through the property in a northeasterly direction.

E.M. Graham (22)

In 1979 E.M. Graham held two contiguous patented claims numbers TB 1048 and TB 1049 at Cook Lake about 3 km north of Schreiber. One of these claims TB 1048, was known as the Mudge claim and is believed by the author to have been held by J.D. Mudge. It was formerly part of the Otisse pyrite claim X 776 (Hopkins 1921 p. 25). The claims were in good standing on December 31st, 1979

Exploration had been carried out in the past for pyrite as a source of sulphur, but the old pits were not found on the current survey, but loose cobbles of grey pyrite 15 cm-20 cm across containing disseminated pyrite grains up to 3 mm X 5 mm were observed in the soil. No outcrops were found but a strong magnetic attraction was shown by the compass in the vicinity of the boulders and a band of ironstone shown on the map of the southwestern part of the Schreiber Area (Harcourt 1939, Map 47j). The old workings had been visited by E.L. Fraleck in 1907 (Fraleck 1907 p. 177) and were described by him viz:

> "A heavy fahlband strikes east and west for about a mile. The gossan capping had in several places been removed and test pits sunk. The largest of these was about 12 feet

deep and 12 feet long across the strike of the deposit, which is here seen to consist of a very fine grained mixture of pyrite, pyrrhotite and silica (banded). An average sample of the dump yielded 32.26 percent of sulphur."

Hopkins (1922, p. 25) stated that the "pyrite formation gives way in places along the strike to iron formation, banded magnetite and quartz, on either side of which is Keewatin pillow lava impregnated with calcite." Current mapping shows the claims to be underlain by mafic metavolcanics.

H. Greenfield (23)
(Johnston-McKenna Prospect)

In 1979 H. Greenfield held three contiguous patented claims numbers TB 13126, TB 13127, and TB 13128 located 3 km north-northeast of Schreiber. They formed part of the former property of Cook Lake Gold Mines Limited incorporated in 1936, and in 1959 they were part of the Mina-Nova Mines Limited property. In 1965 Bar-Manitou Mines Limited acquired an option on the claims. The claims were in good standing on December 31st, 1979.

Exploration work was carried out on the northern-most claim of the property, TB 13128, from 1936 by Cook Lake Gold Mines Limited. Work was done on a quartz vein 2.5 feet wide (0.8 m) striking N 15° E and dipping 45° N enclosed in mafic metavolcanics. Exploration consisted of stripping and trenching and the driving of an adit, in which a trench 100′ (30 m) long was cut on the vein at the surface and the adit driven for 410 feet (125 m) into the hill to intersect the vein at depth. The vein was intersected at a depth of 50 feet (15 m) in the adit where drifting was carried on in an easterly and westerly direction for 70 feet (21 m) and 50 feet (15 m) respectively. The vein was found to narrow down to 8" (20 cm) where intersected at the 50 feet (15 m) level in the adit and to minute stringers at the end of the drifts. Mineralization in the vein consisted of coarse native gold, pyrite, galena and chalcopyrite. A bulk sample consisting of "5 tons taken from the vein underground was reported to have assayed 0.81 ounces per ton in gold" (Harcourt 1939, p. 25).

On the middle claim of the group, Mina-Nova Mines Limited in 1959 described several quartz veins striking north-south or northwest-southeast, with a flat dip to the east. One of these, the main vein, was reported by the company to be 200 feet (61 m) long and 6 to 18 inches (15-46 cm) wide with a north-south strike and a dip of 35oE. Mineralization was reported to consist of native gold, pyrite and minor chalcopyrite. Nine samples taken from the main and other veins by P.S. Broadhurst in 1959 assayed up to 30 ounces gold per ton (Resident Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay).

Hacquoil Construction Limited (24)
(former Harkness - Hays Mine)

In 1980 Hacquoil Construction Limited held two continuous patented claims numbers TB 3327 and TB 3354 straddling Highway 17, 3 km east-southeast of Schreiber. They formed the original Jackson-Harkness claims. This property, known as Vimy Ridge, was recorded in 1920. In 1925 Harkness-Hays Gold

Mining Company Limited acquired the property. In July 1934 Harkness-Hays Gold Mining Company Limited, renamed the Harkness-Hays Gold Mines Limited later in the year, was incorporated and acquired the two claims. Then in 1937 Kay-Hays Mines Limited was incorporated and obtained the claims as part of a 5-claim property. Its charter was cancelled in 1948. The claims were in good standing December 31st, 1980.

Exploration activity began in 1918 and continued intermittently until 1936 when work on the property was suspended by which time eight quartz veins had been discovered. Development work amounted to about 1635 feet (498 m) of drifting and crosscutting and 25 feet (8 m) of raising in five adits on the property by the various owners. On vein No. 3 there were two adits, a longer one at 20 feet (6 m) above the level of the low ground to the south, the other at 100 feet (30 m) above this one. A platform was erected near the top of the hill at No. 3 vein with a chute to channel the ore to a 25-ton amalgamation mill set up on the property in 1935.

The general strike of the veins is northeasterly except for No. 8 located in the western part of the property which has a northwesterly trend. Current mapping by the field party showed that the veins are quartz veins mineralized with coarse pyrite occurring as cubes which occasionally contain visible gold. When weathered the pyritized veins give the appearance of an ironstone unit. The veins intersect mafic metavolcanic rocks and a quartz-feldspar porphyry intrusion and occur within 0.4 km of the contact of the Terrace Bay granitic batholith. The contact zone is intruded by pink micrographitic sills and dikes. The No. 1 vein is a westward extension of the No. 1 vein on the adjoining property (Gold Range) to the east. The strike of the vein is N 50° E and the vein dips steeply to the northwest. It was reported by J.C. Houston (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay), to be from 1-3′ (0.3-0.9 m) wide, but its length on the property was not recorded. It was developed by an 150-foot (46 m) northeasterly trending adit. An assay value of 3.53 ounces gold per ton was obtained by Harkness-Hays Gold Mining Company Limited in 1929 from an unknown type of sample, a grab sample yielded 27.4 ounces gold per ton, while a ton of ore taken from the vein yielded 5.61 ounces gold and 3.21 ounces of silver. The No. 2 vein is also a westerly extension of the No. 2 vein on the adjoining Gold Range property to the east. The strike of the vein is N 30° E with a steep dip to the northwest. This vein was mined out but no assays are available. The No. 3 vein, reported by G.L. Holbrooke (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay) as being the most important one because of its gold content, is a quartz vein variously reported as 1′-6′ (0.3-2 m) wide or 3"-14" (8 cm-36 cm) wide and at least 500 feet (152 m) long at the surface. Its strike is N 43o E and dip 70o NW. Surface development consisted of three trenches. Underground development was carried out by two adits, an upper one driven into the hill about 30 feet (9 m) along the vein, and a lower adit having the shape of a Y, 100 feet (30 m) below the upper adit. This lower adit was about 650 feet (198 m) long along the vein, with 125 feet (38 m) of crosscutting. A crosscut was turned off from this adit in a north-westerly direction for about 400 feet (122 m) to intersect other veins below surface. A channel sample over 12 inches (.3 m) assayed by Harkness-Hays Gold Mining Company Limited contained 14.73 ounces gold per ton. Gold Range Mines Limited reported 40.74 ounces gold per ton over 10 inches for this vein possibly from a channel sample. The No. 4 vein was said to be from 1-4 feet (0.3-1.2 m) wide with the same dip and strike as No. 3 vein. The same company obtained a channel sample assay of 21.31 ounces of gold per ton over 12 inches (0.3 m). The No. 5 vein is similar in strike, dip and width and yielded an assay of 4.83 ounces gold per ton from an unknown kind of sampling. The No. 8 vein was reported to have an average width of 100 feet (30 m) and be in excess of 700 feet (200 m) long. Its strike is northwest-southeast with a dip of 60° to the northeast. It yielded an assay of 0.23 ounce gold per ton over 5 feet (1.5 m) from an unknown kind of sampling. Samples of an unknown type taken from the outcrop of the vein assayed up to 32 ounces gold per ton as reported by Harkness-Hays Gold Mining Company Limited. At the time of suspension of operations in 1936, 194 ounces of gold and 75 ounces of silver were obtained by the milling of 78 tons of ore. The veins were resampled in 1939 by Sylvanite Gold Mines Limited but the assay values could not be reproduced by this company and further development was not recommended (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay).

Halonen Occurrence (25)

(Dickenson Option)

In 1965 Dickenson Mines Limited held on option a claim from J.E. Halonen near the western part of Walker Lake about 2.5 km northwest of Schreiber. The claim was not in good standing in 1979.

Exploration work consisted of the drilling of one diamond drill hole by Dickenson Mines Limited for a total length of 506 feet (154 m). Current mapping shows that the claim is underlain by granitic rocks of the Whitesand Lake Batholith. Molybdenum-copper mineralization was encountered in the drilling but no assays are on file.

J.E. Halonen (26)

(Singleton-Gray Occurrence)

In 1979 J.E. Halonen held a surveyed patented claim TB 4769 located 0.75 km south of Schreiber. This claim was originally part of claim R 680 of unknown ownership. It was last held by R.W. Pitkanen in 1970, and in 1973 J.E. Halonen was the holder. The claim was in good standing on December 31st, 1979.

During the period 1970-1972 R.W. Pitkanen carried out blasting and stripping in the southeastern corner of the claim. A pit 6′ X 10′ X 6′ (2 m X 3 m X 2 m) was blasted out on a vein in intermediate metavolcanics. Harcourt (1939, p. 27) had reported that galena was found in this vein and that it was said "to yielded silver on assay" (Harcourt 1939, p.27). In 1973 J.E. Halonen continued this work excavating a trench 30′ X 5′ X 10′ (9 m X 2 m X 3 m) deep on a silicified shear trending N 30° W and dipping 80° NE, mineralized with stringers and disseminations at pyrite. No assays are available.

J.E. Halonen (27)

(Sox Creek Occurrence)

In 1979 J.E. Halonen held two contiguous unsurveyed claims located about 3 km northwest of Sox Lake in the northwestern part of the map-area. In 1970 Briar-Court Mines Limited held an option on the property and in 1971 assigned fifty percent interest in its option to Zenmac Metal Mines Limited. The latter dropped its option in the same year. The claims were in good standing on December 31st, 1979.

In 1970 Briar-Court Mines Limited carried out a program of pitting, trenching and geological mapping on the property. Disseminated molybdenite and chalcopyrite mineralization was encountered. In 1971 Zenmac Metal Mines Limited carried out a detailed sampling program. In 1979 Longlac Mineral Exploration Limited carried out a geological survey in an area including the property and drilled four diamond drill holes for a total of 1004 feet (306 m) on the occurrences.

Current mapping by the writer has shown that the molybdenum-copper mineralization occurs as stringers and fine disseminations of molybdenite and chalcopyrite in quartz veins, and ptygmatic quartz veins. The host rocks are biotite-quartz-feldspar gneiss showing quartz porphyroblasts that comprise a migmatized contact zone between granitic rocks and foliated amphibolite derived from basalt. The mineralization occurs also in the amphibolite and in irregular quartz masses within the gneiss and granitic rocks. The mineralized zone is 60 m wide and 300 m long and strikes N 80° W. The biotite-quartz-feldspar gneiss is regarded as a metasediment as this rock is seen to grade into less highly metamorphosed wacke in some parts of the mineralized area, and metawacke was observed flanking the amphibolite to the south. Both the amphibolite and metawacke strike east in the area and represent a septum of supracrustal metavolcanic-metasedimentary rocks. Foliation strikes on average east with a dip ranging from 65° to the vertical.

Assay results on samples taken by Briar-Court Mines Limited returned "values in five trenches over a 700 foot (213 m) length ranging from 0.06-6.40 percent molybdenum and 0.11-5.52 percent copper" (Northern Miner 1971, p. 14). Assay of a grab sample by the Geoscience Laboratories, Ontario Geological Survey from biotite-quartz-feldspar gneiss in one of the pits across the contact zone gave an analysis of 0.66% copper and 0.58% molybdenum. Molybdenite and chalcopyrite mineralization was encountered at depth in the drilling, the highest value for mineralization was observed as 20% MOS2 and 10% chalcopyrite in a 1 inch seam in feldspar porphyry, no assays were given.

W.D. Hays (28)

In 1979 W.D. Hays held the patented claim TB 7241 located at the southwestern shore of Walker Lake about 2.5 km northwest of Schreiber. The claim was in good standing on December 31st, 1979.

No exploration work is filed for the claim but current mapping shows that the upper two-thirds of the claim is underlain by granitic rocks and the lower third by intermediate metavolcanics and possibly metasediments.

HBOG Mining Limited (29)

In 1977 HBOG Mining Limited held two unsurveyed, unpatented claims at the northwestern ends of Hollinger and Lamont Lakes respectively northeast of Schreiber. The claims were not in good standing in 1980.

At Hollinger Lake exploration consisted of drilling of one diamond drill hole for 347 feet (106 m) in a southwesterly direction in terrain underlain by mafic metavolcanics and interlayered ironstone to test an electromagnetic conductor located in the area. Andesite, wacke, chert, argillite and rhyodacite were encountered in the drilling and mineralization consisted of pyrite and graphite. Assays for base and precious metals yielded only trace amounts. At Lamont Lake a diamond drill hole was drilled in a southwesterly direction for 221 feet (67 m) and encountered graphite, chert and dacite. Pyrite and graphite mineralization was encountered but base and precious metal assays by HBOG Mining Limited yielded only trace amounts.

Hudson Bay Exploration and Development Company Limited (30)

In 1974 Hudson Bay Exploration and Development Company Limited held a group of 9 contiguous unsurveyed and unpatented claims at the central part of the eastern boundary of the map area east of Mile 8-Mile 9 on the Kimberly-Clark of Canada road. The claims were not in good standing in 1981.

Two diamond drill holes were drilled for a total of 264 feet (80 m) in 1973 and one hole was drilled for a total length of 139 feet (42 m) in 1974. Andesite, garnetiferous andesite, and amygdaloidal andesite were encountered in the drilling. Mineralization consisted of disseminated, stringer and massive pyrite and pyrrhotite in graphitic slate. No assays were recorded. The property is underlain by mafic tuff breccia and intermediate and felsic tuff.

Ironlake Occurrence (31)

This sulphide facies ironstone deposit consists of discontinuously exposed massive pyrite and pyrrhotite located a quarter mile southeast of the southern end of Walker Lake which is 1.6 km northwest of Schreiber. The deposit is located on the former Ironlake Exploration Limited (1948) and Ellwood Mining Exploration Company Limited (1957) properties.

In 1948 Ironlake Exploration Limited held the claim, which was surveyed but apparently not patented, on which the deposit occurs. Under previous owners, several pits and one short adit were blasted on the deposit and these revealed massive, mainly fine-grained pyrite and pyrrhotite. Ironlake Exploration Limited carried out a dip-needle geophysical survey in 1948 which disclosed a "wide magnetic area crossing the claim in a general east-west direction" (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay). It was believed that most of the high magnetic readings were due to magnetite. In 1956 Aerophysics of Canada Limited carried out an airborne electromagnetic survey of an area which included the deposit. An anomaly was found to be associated with the deposit and in the summer of 1957 McPhar Geophysics Limited carried out ground electromagnetic surveys to locate the anomalies more accurately. In the fall of the same year the same company carried out a geological survey. These surveys indicated that the anomaly was associated with sulphide facies ironstone. The deposit was then diamond drilled at the end of 1957 and the beginning of 1958 by Ellwood Mining Exploration Company Limited. Three diamond drill holes were sunk on the sedimentary unit enclosing the deposit, for a total of 990 feet (302 m). No further exploration work was carried out since then.

Current mapping shows the deposit to consist of a band of massive pyrite about 183 m long and about 2 m wide hosted in a metasedimentary unit comprising graphitic shale, grey carbonate, chert and iron sulphide. The deposit strikes N 100° S and dips °0° North. This sedimentary sulphide ironstone unit is underlain by intermediate metavolcanics and rhyolite of the lower volcanic cycle and is overlain by basalt of the upper volcanic cycle. A reported representative sample of the mineralization taken from the surface exposures in 1957" yielded traces of zinc by spectrographic examination and 0.24 ounce silver and 0.06% copper by assaying" (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay). Ten samples of drill core were taken by Ellwood Mining Exploration Company Limited in 1958 and assayed by that company for gold, silver, copper, zinc and nickel. The best mineralized section 5.0 feet thick, yielded 0.20

ounces of silver per ton but nil values in gold, copper, zinc and nickel.

F.V. Kelly, R.F. Miller and C.C. Skinner (32)

In 1979 F.V. Kelly, R.F. Miller and C.C. Skinner held patented, surveyed mining claim TB 1990 at the southern end of Walker Lake about 2 km northwest of Schreiber. The claim was in good standing at Dec. 31st 1979.

No exploration work is recorded for the claim but current geological mapping has shown that it is underlain by mafic and intermediate metavolcanics and metasediments.

Kenecho Gold Mines Limited (33)
(Schreiber Pyramid Mine)

In 1980 Kenecho Mines Limited held a block consisting of seven contiguous patented surveyed claims numbered TB 10089, TB 10090, TB 10092, TB 10093, TB 10094, TB 10097 and TB 10101 located about 5 km northeast of Schreiber. The property is part of the original property held by Schreiber Pyramid Gold Mines Limited which was incorporated in 1934. Between 1937 and 1950 the property was held by Kenecho Gold Mines Limited. In 1969 Zenmac Metal Mines Limited acquired the property. The claims were in good standing on December 31st, 1980.

Exploration work for gold began apparently in 1934 and continued up to 1939. Schreiber Pyramid Gold Mines Limited reported that the property was mapped geologically in 1936, and that in the same year a road was cut to the property, camp buildings erected, and a 17-ton capacity ball mill was installed to treat the ore. Surface exploration consisted of pitting, trenching and diamond drilling and underground exploration consisted of the driving of adits, drifting and crosscutting on two veins. This exploration work resulted in the discovery of six quartz veins in mafic metavolcanics and diorite. The diamond drilling consisted of 1600 feet (488 m) in three holes completed in 1936, but the location of the holes was not given. On the northern part of the No. 1 vein, located in the western part of the property, an adit was driven northeasterly for 125 feet (38 m) into the hill to intersect the vein at a depth of 50 feet (15 m). The vein was then drifted on for a distance of 124 feet (38 m) in a northwest direction on either side of the intersection. An open cut was made on the No. 2 vein located in the north-central part of the property. This vein was opencut to a depth of about 40 feet (12 m) for a distance of 50 feet (15 m).

Of the six veins discovered on the property the locations of only four were given. The No. 1 vein consisting of two parts called Vein No. 1 (north) and Vein No. 1 (south) are about 700 feet (213 m) apart. The No. 1 and No. 2 veins were considered the most important by the owners, Schreiber Pyramid Gold Mines Limited, because of the occurrence of free gold in them. Most of the exploration work was done on them. The No. 1 vein is composed of quartz, strikes about N 15° W colinear with a photolineament in the area, and dips 50-55° W. The vein was reported to be about 1 foot (0.3 m) wide at the surface narrowing to a few inches at a depth of 50 feet (15 m). It was mineralized with native gold, pyrite and chalcopyrite, in contact to the west with a lamprophyre dike.

The combined length of the vein is 400 feet (122 m) exposed intermittently over a strike length of 1000 feet (305 m). No assays are available in the company reports but a grab sample taken from the northern exposure of the vein during the present survey and assayed by the Geoscience Laboratories, Ontario Geological Survey, returned a value of 0.35 ounce gold per ton. The No. 2 vein is also composed of quartz and is located 260 m northeast of the northern exposure of No. 1 vein. It is 13-26 cm wide, about 152 m long, strikes N 45° W and dips 45° NE. It is in mafic metavolcanics and was reported by Harcourt (1939, p. 21) to be mineralized with pyrite, chalcopyrite, galena and sphalerite accompanied by tourmaline. A grab sample taken by the Ontario Geological Survey field party in 1980 from the vein and assayed by the Geoscience Laboratories, Ontario Geological Survey, returned a value of 0.01 ounce gold per ton. Vein No. 4, is located 46 m south of Vein No. 2. This vein was not relocated during the current mapping but was described by Harcourt (1939, p. 21) as:

> "a shear zone dipping 80° N which appears to have been developed along a narrow band of sediments. Trenching along this shear zone immediately south of the vein has disclosed mineralization 5 to 6 feet (1.5 m to 2 m) wide consisting of massive bands of pyrite, pyrrhotite, chalcopyrite, and sphalerite. It is reported that a considerable amount of native gold has been removed from the rusty outcrop in this shear zone".

No assays are available.

In 1969, when Zenmac Metal Mines Limited acquired the property, this company drilled 5 diamond drill holes for a total of 798 feet (243 m) in an area 91 m north of Vein No. 2 in the northern part of the claim group reported by the company to be underlain by mafic metavolcanics interlayered with metasediments. A one-foot section of chlorite schist mineralized with massive chalcopyrite, sphalerite, and pyrrhotite between 88.7 and 89.7 feet (27.0 and 27.3 m) assayed 19.20% zinc and 4.65% copper, as reported in the drilling log by the company.

Kennco Explorations (Canada) Limited (34)

In 1971 Kennco Explorations (Canada) Limited held 176 unpatented, unsurveyed claims, grouped into fourteen claim blocks, some of which were located in the eastern half of the map-area. These claims were not in good standing in Dec. 1981.

Within the map-area, the area surveyed lay east of a line connecting Rhumly and Ellis Lakes in the east-central part of the eastern half of the map-area. The objective of the work by Kennco Explorations (Canada) Limited "was to locate any economic deposits of heavy or massive sulphide mineralization which might occur in a near-surface location within the volcanic rock units" of the survey area (Regional Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay). Exploration activity commenced in 1971 and consisted of a combined airborne electromagnetic and airborne magnetic survey carried out by Lockwood Survey Corporation Limited. The airborne anomalies were parallel to the trend of the rock units. Ground electro-magnetic and magnetic surveys disclosed six conductive zones some of which are associated with magnetic anomalies. Three diamond drill holes were recommended to be drilled to test the conductors. It was felt by the company's geophysicist that most of the conductors could be "caused by graphite, graphite-pyrite or pyrite zones closely associated with... magnetite-bearing iron formation rather than pyrrhotite-pyrite or pyrrhotite graphite zones" (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay). Interflow ironstone units are known to occur in the map-area but none was located during the current mapping in this area. Current mapping shows that this area lies entirely within the metavolcanics of the Abitibi Subprovince and is underlain by mafic to felsic metavolcanic rocks.

Kimberly-Clark Pulp and Paper Company Limited (35)

In 1980 Kimberly-Clark Pulp and Paper Company Limited held one patented surveyed claim TB 3413 located at the southwestern end of Hays Lake about 4 km east-southeast of Schreiber. The claim was in good standing on December 31st 1980.

No exploration work is on file for the property but current mapping shows that the claim is underlain by granitic rocks of the Terrace Bay Batholith and mafic metavolcanic rocks, the contact trending northwesterly across the claim.

E.G.A. Lang (36)

In 1980 E.G.A. Lang held one surveyed patented claim TB 2364 straddling Highway 17 and located 1.5 km. southeast of Schreiber. The claim was in good standing on December 31st, 1980.

No exploration work is on record for the claim but current mapping has shown that it is underlain by mafic and intermediate metavolcanic rocks in faulted contact with each other, the trend of the fault being north-northeast.

B.S. Larson (37)

In 1981 B.S. Larson held one surveyed patented claim TB 2314 located at the northeastern end of Big Duck Lake located about 21 km north of Schreiber. The claim was in good standing on December 31st, 1981.

Little Bear Occurrence (39)

This occurrence is located at Little Bruin Lake, 7 km north-northeast of Schreiber, on claim TB 35257. The deposit was discovered in 1937. The property, comprising two contiguous surveyed claims TB 35257 and TB 352458, was held by R.W. Pitkanen in the period 1970-1972. In 1973 it was under option to Sturgex Mines Limited and Royex Mining Limited from J.E. Halonen, the new owner. The surveyed claims were cancelled in 1980, and not in good standing on December 31st, 1980.

Trenching and pitting began in 1937 which revealed a vein 6 inches (15 cm) wide, 200 feet (61 m) long with a strike of N 50°W and a dip of 75° SW. In 1950 two holes were diamond drilled for a total of 88 feet (27 m) by J.E. Halonen. In the period 1970-72 pitting and trenching were carried out on the vein. A shaft 8′ X 8′ (2.4 m X 2.4 m) was also put down on the vein.

Examination of the deposit by the writer showed it to be a quartz vein 2 m wide and 45 m long, mineralized with chalcopyrite sphalerite, and pyrite occurring as stringers, disseminated specks and in the massive state in mafic metavolcanics. Native gold was reported to occur in the vein when it was examined in 1937, and was described as being "light-yellow in colour and... intimately associated with the pyrite" (Bartley 1939, p. 37). The vein is considered by the writer to fill a fracture interpreted as a pinnate fracture related to a 610 m long north-northeasterly trending fracture with which it is interpreted to connect on its northwesterly end in a marsh. Assay of a grab sample of mineralized, silicified vein material taken during the current survey and analyzed by the Geoscience Laboratories, Ontario Geological Survey yielded 0.01 ounce of gold per ton, 0.07% zinc and 46 ppm copper.

Long Lac Minerals Exploration Limited (40)

In 1979 Long Lac Mineral Exploration Limited held 31 contiguous, unsurveyed, unpatented claims in the northwestern corner of the map-area about 25 km northwest of Schreiber. These claims enclosed the two claims forming the J.E. Halonen property No. 27. The claims were in good standing on December 31st, 1979.

In 1970 Briar-Court Mines Limited carried out pitting and trenching on the property which led to the discovery of chalcopyrite, molybdenite and nickel mineralization. Assay values from a trench about 91 m east of the Halonen Occurrences, taken by Briar-Court Mines Limited "returned grab samples over a 100 feet width with values of 0.06 percent copper and 0.43 percent molybdenum" (Northern Miner 1971, p. 14). In 1979 Long Lac Mineral Exploration Limited carried out geological mapping at a scale of 1:6,000 feet, a geochemical survey and drilled four diamond drill holes for a total length of 1004.00 feet (306 m). The drilling was confined to the two claims held by J.E. Halonen, whereas the geological and geochemical surveys covered both the properties of J.E. Halonen and Long Lac Mineral Exploration Limited. The results of the drilling program have been described under property No. 27.

Lormac Explorations Limited (41)
(former Otisse Mine)

In 1980 Lormac Explorations Limited held a group of eight contiguous mining claims three of which were patented, numbers TB 3350, TB 3351 and TB 3412 located on the western shore of Hays Lake 4.4 km east of Schreiber. These claims included the original property of the Otisse Gold Mining Company of Schreiber Limited, incorporated in 1897, on which gold was discovered in 1896 on claim TB 3412. This claim was later restaked by W.S. Jackson about 1920 and it later became part of the property of Otisse Long Lac Gold Mines Limited. Then in 1936 it formed part of the property of the New Otisse Long Lac Gold Mines Limited which was incorporated in that year and who held it until 1942. In 1974 Lormac Explorations Limited was incorporated and in 1980 acquired the property, which was in good standing on December 31st, 1980.

Exploration activity began on the property in 1896 when gold was discovered on claim TB 3412. In 1897 two shafts were begun 122 m apart on a northeast shear about 183 m long. The shafts ultimately reached depths of 52 and 39 feet (16 m and 12 m). Five veins in all were discovered on the property, but only one was then developed. Several pits and trenches were put down on the main vein. Considerable surface work was done by New Otisse Long Lac Gold Mines Limited during the period 1936-1939. The main vein was stripped for 500 feet (152 m) and channel samples were taken. In 1980 geophysical work consisting of magnetic and electromagnetic surveys were carried out by Lormac Explorations Limited on the property. Three northeasterly-trending anomalous zones were located in the electromagnetic survey, and several northeasterly-trending banded iron formation units were encountered during the magnetic survey. In 1980 the same company did approximately 2523 feet (769 m) of diamond drilling in 16 holes on one of the iron formation units associated with a geophysical anomaly.

The main deposit consisted of a 2 1/4 - 4 feet (0.69 to 1.2 m) wide quartz vein striking N 45° E and dipping vertically and is 500 feet (152 m) long at the surface, discontinuously exposed, and in mafic metavolcanics. Chert-magnetite ironstone, quartz-feldspar porphyry and a two-foot (60 cm) wide lamprophyre dike are reported associated with the vein. Mineralization consists of disseminated pyrite, chalcopyrite and galena and graphite. In 1897 a "mill test of one ton made at Kingston gave $15.53 as the value of the free gold and concentrates. A sample taken for assay gave $15.00 per ton" (Willmott 1898, p. 134; gold at about $18.69 per ounce). A grab sample from the vein taken by G.A. Harcourt in 1936 (Harcourt 1938, p. 20) gave on assay by the Provincial Assay Office 0.20 ounce gold per ton. The pits and trenches were sampled by Sylvanite Gold Mines Limited and values up to 1.04 ounces per ton over 1.00 foot (0.3 m) were reported (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay).

J.A. MacDonald (42)

In 1980 J.A. MacDonald held one surveyed patented claim TB 3876 located at the northwestern corner of Hays Lake about 5 km east-northeast of Schreiber. The claim was in good standing on December 31st, 1980.

No exploration work is on record for the claim but current mapping shows it to be underlain by mafic metavolcanic rocks.

Donald MacEchern (43)

In 1980 Donald MacEchern held 8 unsurveyed claims located about 4 km southeast of Schreiber stradding the C.P.R. Line, and 3 additional unsurveyed claims along the northern part of Kenecho Mines Limited property, located about 5 km northeast of Schreiber, and 1.5 km southwest of Big Bruin Lake. The claims were in good standing on December 31st, 1980.

No exploration work is on file for the claims. Current mapping shows that the claims straddling the CPR line southwest of Hays Lake are underlain by the Terrace Bay Batholith, at their eastern end and mafic and intermediate metavolcanics at their western end. The claims located northeast of Schreiber are underlain by mafic metavolcanics and by hornblende syenite and pegmatite.

J. MacKenzie and H. MacLeod (44)

In 1979 J. MacKenzie and H. MacLeod held one patented surveyed claim TB 3808 located at Fourth Lake in the centre of the Schreiber Peninsula about 3 km south-southwest of Schreiber. The claim was in good standing on December 31st, 1979.

No exploration work is on file for the property but current mapping has shown the claim is underlain by intermediate metavolcanic rocks, with an outcrop of hornblende-biotite syenite in the extreme southeastern corner.

A.B. McCuaig (45)

In 1980 A.B. McCuaig held one patented surveyed claim TB 5578 located about 2.5 km southeast of Schreiber, south of Lamont Lake. The claim was in good standing on December 31st, 1980.

No exploration work is on file for the claim but current mapping shows it to be underlain by mafic metavolcanic rocks.

A.E. Mullin (46)

In 1979 A.E. Mullin held 6 patented, surveyed claims in two groups: a group of 4 claims numbered Z88, TB 4758, TB 10626 and TB 3801, and another group of two claims numbered TB 4594 and TB 4595. The first group is located in the southwestern part of Schreiber peninsula about 4 km southwest of Schreiber. The second group is located about 1.5 km south-southeast of Schreiber. The claims were in good standing on December 31st, 1979.

No exploration work is on file for the group of four claims but Hopkins (1921, p. 14) wrote that "Mr. Mudge stated that in or about the year 1900 an Indian named Ogama found gold about one and one-quarter miles northwest of the McKellar-Longworth". On p. 7 of the same report Hopkins (1921) shows the location of this discovery which would place the discovery on claim Z88, in metavolcanic rocks. Current mapping shows the claim group is underlain by granitic and metavolcanic rocks, the latter rocks occurring in the southwestern and southeastern parts of the property.

No exploration work is on file for the two-claim group but current mapping shows that the claims are underlain by intermediate metavolcanic rocks.

I.C. Murray (47)

In 1979 I.C. Murray held one surveyed patented claim TB 3800 located just south of Fourth Lake in the centre of Schreiber peninsula about 4 km south-southwest of Schreiber. The claim was in good standing on December 31st, 1979.

No exploration work is filed for the claim but current mapping shows it to be underlain by syenitic rocks cut by a west-northwesterly diabase dike.

T. Noble (48)

In 1980 and 1981 T. Noble held 3 claims in two areas: a group of two claims located about 3 km southeast of Schreiber; and one claim located at the middle part of the eastern boundary of the map-area at the south-western end of Owl Lake. Of the two claims near Schreiber one is a surveyed claim, TB 3793. This property formed part of the original Cleaver property, Downey property, Hannam Exploration Limited property, the Pitkanen property, and the D.E. Gale property. The claim at Owl Lake is surveyed claim TB 113457 (formerly TB 3695) and formed part of the Zenmac Metal Mines Limited property. Both surveyed claims were in good standing on December 31st, 1980 and 1981 respectively.

Schreiber Area

There are two types of deposit in this area consisting of pyrrhotite-magnetite mineralization (Downey Occurrence) and molybdenum-copper mineralization (Pitkanen, Blanchford and Other Occurrences).

Pyrrhotite-Magnetite Mineralization
(Downey Occurrence)

Exploration work on the pyrrhotite-magnetite occurrence known as the Downey deposit, was carried out in or previous to 1921. It consisted of pitting and the driving of an adit 60 feet (18 m) long southerly onto the deposit to crosscut the occurrence which was described as a "60′ wide band of iron formation" (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay). The strike of the deposit is N 60° E. This adit was examined in 1939 by Sylvanite Gold Mines Limited and the channel samples were assayed for gold. Only trace quantities of gold were reported by the company, the actual amounts not being reported (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay). About 1948 Ironlake Exploration Limited carried out a dip-needle survey over the body. In 1956 Noranda Mines Limited drilled two diamond drill holes in the neighborhood of the deposit for a total of 543 feet (166 m). In 1965 Tri-J Mineral Surveys Limited carried out a vertical magnetic intensity survey over the occurrence.

The deposit is a massive sulphide pyrite - pyrrhotite - magnetite body associated with molybdenite and chalcopyrite, in quartz-feldspar porphyry and granite pegmatite, at the contact the Terrace Bay granitic batholith and contact-metamorphosed grey cherty metasediments. The deposit is considered by the author to represent the contact metamorphic equivalent of the Morley pyrite-pyrrhotite deposit (see this report). The mineralized area is about 24 m long, 18 m wide, trending N 60° E. The adit driven into the hillside to intersect the body was channel-sampled by Sylvanite Gold Mines Limited in 1939 for gold. Only traces of gold were obtained on assay. The sampling was carried out because "values up to 7.00 dwt [0.35 oz]" had been reported (Resident Geologist's

Files Ontario Ministry of Northern Development and Mines, Thunder Bay).

Molybdenum-Copper Mineralization

There are three molybdenum-copper occurrences on the property: one associated with the pyrrhotite-magnetite occurrence just referred to and known as the Pitkanen deposit; another, the Blanchford deposit located at the southern boundary of claim TB 3793 along the Hydro Electric Line right-of-way; and a third unnamed occurrence located 335 m southwest of the Pitkanen Occurrence.

Pitkanen Occurrence

Exploration and evaluation of the Pitkanen deposit was carried out in 1965 by Nor-Acme Gold Mines Limited by trenching and sampling. This was followed by a magnetometer survey in 1969 and a copper-molybdenum geochemical survey in 1970, both by Univex Exploration and Development Corporation Limited. During this same period, 1969-1970, the latter company drilled five diamond drill holes for a total length of 1616 feet (493 m) on the deposit.

The occurrence is a quartz-feldspar porphyry which is a marginal phase of the Terrace Bay Batholith. The porphyry is cut by aplite dikes, and by ramifying quartz veins varying from 1.3 to 10.1 cm wide in a northeasterly-trending mineralized area about 15 m wide by about 45 m long. Mineralization in the quartz veins and the porphyry consists of pyrite, chalcopyrite, and molybdenite, as disseminated flakes, blebs, and grains, with rosettes of molybdenite. The grains measure 3-5 mm across. The best assay from picked samples taken by Nor-Acme Gold Mines Limited in 1965 from the quartz veins was 3.25% molybdenum and 0.01% copper, with traces of gold and silver (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay). Assay of a grab sample taken during the current survey of the mineralized quartz-feldspar porphyry yielded 0.10% molybdenum and 0.08% copper, and from the quartz vein 0.22% molybdenum and 0.15% copper on analysis by the Geoscience Laboratories, Ontario Geological Survey, Toronto. The best assay result from drill core from drilling of the occurrence in 1969 by Univex Exploration and Development Corporation Limited was 0.2% molybdenum and 0.2% copper over 2 feet (0.60 m) in monzonite (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay).

Blanchford Occurrence

No record of exploration activity is on file for this deposit, but examination of the deposit during the current survey shows that blasting and trenching had been carried out in the past, sometime during or before 1921 as the vein was referred to by Hopkins (Hopkins 1922, p. 23) and is shown on Map 30a (Hopkins, 1922) which accompanies that report.

The deposit is a quartz vein striking 100°, is up to 12 inches (0.3 m) wide and about 300 feet (91 m) long with a dip of 60°S. It is located on the power line south of Highway 17 and is mineralized with molybdenite and chalcopyrite, pyrite and pyrrhotite. The vein is in hornblende granitic rock. A grab sample taken from the mineralized quartz vein during the current survey and assayed by the Geoscience Laboratories, Ontario Geological Survey, returned a value of 0.25% copper.

Other Occurrence

Also mentioned in the company report of Nor-Acme Gold Mines Limited are "half a dozen pops (sic, excavations) 20 feet (6 m) apart in the syenite which have exposed quartz veins with molybdenite. The veins with varying dips and strikes range from 1/4 to 4 inches (0.64-10.2 mm) in width and are up to 3 feet in length" (Regional Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay). These occurrences were not located during the current survey but would occur about 335 m southwest of the Pitkanen Occurrence. No assays were on file for these occurrences.

Owl Lake Area

Owl Lake Occurrence

This occurrence was first described by Bartley (Bartley 1939, p. 40) during his mapping of the northwestern part of the Schreiber Area. By 1937 the property had been explored by trenching, pitting, and diamond drilling. Two diamond drill holes were put down for an unknown total length. In 1966, four diamond-drill holes were drilled on the occurrences for a total length of 159.7 m, and a detailed geological map was made by Halet, Broadhurst, and Ogden Associates for Zenmac Metal Mines Limited and Pipawa Explorations Limited. Molybdenite, chalcopyrite, pyrite and pyrrhotite mineralization was observed during the diamond drilling. Then in 1969, a magnetometer and soil geochemical survey were carried out at the occurrence by Halet, Broadhurst, and Ogden Engineering Limited for Zenmac Metal Mines Limited and Pipawa Explorations Limited. Magnetic anomalies were found, the main one parallel to the trend of the veins, but not extending outwards from them. Only one geochemical anomaly was located, and this occurred in the vicinity of the showings. Anomalous molybdenum results were found parallel to the trend of the showings, and extending beyond them into area covered by overburden. In 1972, a detailed geological map of the property was prepared by Halet, Broadhurst, and Ogden Engineering Limited for Zenmac Metal Mines Limited and Pipawawa Explorations Limited, at a scale of 1 inch to 300 feet and a detailed geological map of the occurrences at a scale of 1 inch to 50 feet.

The occurrence was described as follows by Bartley when he visited it in 1937 (Bartley 1939, p. 40):

> "The Owl Lake molybdenite property consists of claims TB 3,694 and 3,695, approximately 3 miles north of the junction of Owl Creek and the Aguasabon River. The mineralized zone consists of a plug-like body of granite intruding syenite gneiss and hornblende schists. The schists appear to have been derived from andesite tuffs.
>
> The granite is pegmatitic in character, consisting principally of quartz and feldspar with a predominance of quartz. The veins are glassy quartz and vary in strike, but the main veins have a general east-west trend and dip steeply to the south. They range in width from a few inches to 3 feet, and the maximum length is 100 feet. The zone has a length of 700 feet from north to south.

To the north, the veins become shorter and narrower. The mineralization is quite uniform and plentiful, consisting of pyrite, molybdenite, and molybdite. The occurrence of the molybdenite is very general, as it is found in the veins, at the contact of the quartz and granite, in the granite as a rock mineral, in the fractures in the granite and along the cleavage planes of some of the feldspars.

The showing was explored by trenching and stripping over the whole length of the intrusive and by a series of diamond-drill holes put down to ascertain the extension and values at depth. The drilling results indicated the mineral to be so scattered that the average content was less than 1 percent molybdenum. A grab sample of the quartz taken by the writer and assayed by the Provincial Assay Office gave 1.68 percent molybdenum and 0.03 ounces per ton in gold".

During the current survey the main vein was located along with some of the trenches to the south and north most of which were overgrown and partly filled in. The main vein is well exposed in an outcrop east of a small pond in the southeastern corner of claim TB 3695. The strike of the main vein is N 75° E with a dip of 85° south. This vein is one meter long and 61 cm wide and a pit has been put down on it. The vein consists of white quartz in massive leucocratic, medium- to coarse-grained biotite granite intruded by aplite and pegmatite. Mineralization consists of disseminated molybdenite occurring as blebs and rosettes up to 5 mm in longest dimension, or as irregular stringers, along with disseminated grains of pyrite and minor amounts of chalcopyrite occurring in the quartz vein and the granitic, pegmatitic and aplitic rocks. This mineralized area forms a contact zone about 100 m wide by 500 m long within granitic rocks at the contact of granitic rocks with mafic metavolcanic rocks and gabbro.

Noranda Exploration Company Limited (49)

In 1976 Noranda Exploration Company Limited held eleven contiguous unsurveyed and unpatented mining claims in the east-central part of the map-area about 1 km north-northeast of Rhumly Lake. In 1977 two more claims were acquired adjoining these claims to the west. This property formed part of the property formerly held by Kennco Explorations (Canada) Limited in 1971. The claims were not in good standing on December 31st, 1981. In 1981 this company also held one surveyed claim TB 122 022 located at the southwestern end of Owl Lake in the northeastern part of the map-area. This claim was in good standing on December 31st, 1981.

Exploration on the property by Noranda Exploration Company Limited consisted of a VLF geophysical survey carried out in 1976. Several east-trending conductors were located parallel to the geological trend. This survey was followed by a geological mapping in 1977 on a westerly extension of the property. This part of the property was found to be underlain by basalt and rhyolite. No further exploration work was carried out on the property. No exploration work is on record for claim TB 122 022 at Owl Lake but previous work on the claim (see under T. Noble) indicates a northwesterly-trending quartz vein hosted in pink granitic rocks. This vein occurs in an area mineralized with molybdenum and copper. No assay values for the vein have been recorded.

Glen Norrad (1952) (50)

In 1952 Glenn Norrad held two contiguous unpatented claims which covered the area occupied by the old claims R 701 and 4422 (Map 47; Schreiber Area Harcourt and Bartley 1939) located about 2.5 km southwest of Schreiber on the south side of the C.P.R. tracks. Neither of the two claim groups was in good standing on December 31st, 1979.

Development and exploration work consisted of the driving of an adit 12 feet long (0.3 m) onto a mineralized shear zone and the blasting of two pits east of the adit. The date of this exploration work is unknown.

The deposit was reported by Candela Development Company to consist of a shear zone approximately 2 feet (0.6 m) wide and 100 feet (30 m) long, striking N 45°W and dipping 50°NE mineralized with pyrite with associated minor chalcopyrite and possibly pyrrhotite. The host rock was described as tuff within the flows. Mineralization was said to extend "over a width of 12′ yielding a mining width of 4′ (1.2 m)" (Geologist's files, Ontario Ministry of Northern Development and Mines, Thunder Bay). This deposit was not relocated during the current mapping. No assays are reported in the files. Current mapping shows the area to be underlain by massive medium-grained mafic metavolcanic rocks intruded by a plug of feldspar porphyry at the western limit of the property.

J.L. Nuttall (51)

In 1971 J.L. Nuttall held three patented Mineral Locations Nos. 1, 3, and 4 located at, and southwest of the Town of Terrace Bay in the southeastern part of the map area. The mineral locations were in good standing on December 31st, 1980.

No exploration activity is on file for the property but on Mineral Location No. 1 a quartz vein mineralized with disseminated molybdenite and pyrite was discovered during the current survey at the mouth of the Aguasabon River (see Aguasabon River No. 2 Occurrence, Occurrence No. 6). Current mapping shows the property to be underlain by hornblende-bearing granitic to tonalitic rocks of the Terrace Bay Batholith intruded by east-west diabase dikes.

J.R. Pattison (52)

In 1979 J.R. Pattison held one surveyed patented claim located near the centre of Schreiber peninsula at Fourth Lake about 4 km south-southwest of Schreiber. The claim was in good standing on December 31st, 1979.

No exploration work is filed for the claim but current mapping shows it to be underlain by hornblende-biotite syenite cut by a northwesterly-trending diabase dike. A small enclave of mafic metavolcanic rock and metadiorite or metagabbro occurs in the northeastern corner of the claim.

L.J. Payette (53)

In 1979 L.J. Payette held one surveyed, patented claim TB 3799 located in the eastern part of the Schreiber Peninsula about 4 km south of Schreiber. The claim was in good standing on December 31st, 1979.

No exploration work is on file for the claim but current mapping has shown that it is underlain predominantly by aphanitic intermediate metavolcanics and intermediate crystal tuff with syenite possibly underlying the northwestern corner of the claim. The metavolcanics are cut by an east-trending diabase dike.

Pipawa Explorations Limited (54)

In 1981 Pipawa Explorations Limited held one patented surveyed claim TB 3809 located 1 km south-southwest of Owl Lake in the northeastern part of the map-area. This property formed part of the original Owl Lake property (Bartley 1939, p. 40). The claim was in good standing on December 31st, 1981.

Pitting and drilling were carried out on the claim during or prior to 1937. In 1969 a magnetometer and soil geochemical survey were carried out on the claim by Halet, Broadhurst, and Ogden Engineering Limited. No magnetic or geochemical anomalies were discovered on this claim. In 1972 a detailed geological map was prepared of the claims to the north and it included the northwestern corner of this claim. This map was prepared by Halet, Broadhurst and Ogden Engineering Limited at a scale of 1:3,600. In the same year the same concern prepared a detailed geological map of the occurrences at a scale of 1:600. This map also included the occurrences in the northwestern part of the claim.

No assays of samples from the occurrences are reported.

R.W. Pitkanen (55)

In 1979 R.W. Pitkanen held one unsurveyed, unpatented claim located in the northeastern part of the western half of the map-area, 2.5 km southeast of Ross Lake. This claim formed part of the original eight-claim property of Nicoper Mines Limited which was formed in 1937. This company optioned the property to Cook Lake Gold Mines Limited in 1937 and later to Falconbridge Nickel Mines Limited in 1949. Late in 1950 the property came open and was staked and held by Don Campbell. It was again optioned apparently to Selco Exploration Company Limited in 1953 and to New Athona Mines Limited in 1956. In 1965 the area again came open and was staked in that year by Zenmac Metal Mines Limited. The claim was in good standing on December 31st, 1979.

Exploration work was first carried out during the period 1930-1936, when surface trenching, sampling and the diamond-drilling of three holes in gabbro for an unknown total length was done probably by Consolidated Mining and Smelting Company of Canada Limited (Cominco). Drill logs for the holes are not on file, but the surface work was reported to outline a vein, described in the company report, of massive sulphide 300 feet (91 m) long and 3 feet (.9 m) wide, consisting of nickeliferous pyrrhotite, chalcopyrite, and pyrite in gabbro near its contact with granitic rocks. The vein strikes N 40° E and was said to dip vertically. In 1937 Nicoper Mines Limited carried out further surface exploration and a ground magnetometer survey to trace the extension of the orebody under surrounding overburden. No record of this work is on file. From 1949 to 1950 Falconbridge Nickel Mines Limited carried out a ground magnetometer survey and prepared 1 inch to 200 foot scale geological maps of the property. The magnetometer surveys were carried out to locate possible extensions of the ore zone along strike and to discover any other similar zones on the property. The geological survey was carried out to map the formations in detail and to locate other mineralized areas. Numerous small stringers of sulphide mineralization were located along minor shear planes. Surface mineralization was found to consist of pentlandite, chalcopyrite, pyrrhotite and pyrite, and the main ore zone was described as being 250 feet (76 m) long by 10 feet (3 m) wide. During this time, in 1950, a detailed investigation of the mineralization on the property was carried out and formed the material for a bachelor's thesis by D.T. Anderson (1951). From this work it was inferred that the "deposit represents a hydrothermal assemblage of magnetite, ilmenite, pyrite, pyrrhotite, pentlandite and chalcopyrite, the foregoing being the paragenesis of the minerals" (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay). In 1956 New Athona Mines Limited diamond-drilled four holes, totaling 1693 feet (508 m), to investigate various ground magnetometer and electromagnetic anomalies on the property. The main showing was not drilled as only pyrite mineralization was encountered. In 1965 Zenmac Metal Mines Limited, prepared a geological map of the property at a scale of 1 inch to 200 feet, and diamond-drilled five holes for a total length of 200 feet along a strike length of 160 feet on the main mineralized zone. Chalcopyrite, pyrrhotite, and pyrite were encountered in the holes. In 1969 the same company carried out a detailed ground magnetometer survey on the property locating four anomalous zones. Eight diamond-drill holes, totaling 2107 feet (642 m), were drilled by the company a short distance east of the main showing to intersect the mineralization at depth. Finally, in 1970 Nicohal Mines Limited diamond-drilled nine holes, for a total length of 4040 feet (1231 m) also a short distance east of the main showing, encountering nickel-copper mineralization.

Current mapping has shown that the main mineralized zone is about 122 m long by about 1.5 m wide striking N 40° E and located near the northwestern boundary of an oval-shaped gabbro mass 914 m long by about 305 m wide cut by a northwesterly fault. The gabbro trends northeasterly and is enclosed in granitic rocks. Drilling by Zenmac Metal Mines Limited had established that "a sheet-like zone of nickel-copper mineralization extends to at least 400 feet down dip, where it has lengthened to at least 300 feet. It varies from 5 to 20 feet in thickness and dips 34 degrees" (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay). Surface mineralization consisted of "massive sulphides with disseminated sulphides impregnating the wall for 10 feet (3 m) on each side" (Bartley 1939, p. 37) and comprising nickeliferous pyrrhotite, pentlandite and chalcopyrite associated with magnetite, ilmenite and pyrite. "Two grab samples of the massive sulphides were assayed and gave values of 1.07 percent copper with 4.32 percent nickel, and 0.10 percent copper with 4.88 percent nickel. Low gold values were found in both" (Bartley 1939, p. 37). It is not known who carried out the analysis. The grade of the deposit calculated from drilling results by Zenmac Metal Mines Limited was "about 1.0 percent nickel and 0.3 percent copper over 5 to 15 feet (2m - 5 m)" (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay).

About 200 m northwest of the northern end of the vein a trench 20 m by 0.13 m was blasted into quartz-rich leucocratic hornblende granitic rock cut by a north-south aplite dike about 6 m wide. The granitic rock but not the aplite was observed to be mineralized with massive chalcopyrite, nickeliferous pyrrhotite, and pyrite during the current survey. A grab sample of this mineralization yielded 2.55% nickel, 2.40% copper, and 0.03% zinc on analysis by the Geoscience Laboratories, Ontario Geological Survey, Toronto).

Rio Tinto Canadian Exploration Limited (Riocanex) (56)

In 1981 Riocanex held 120 contiguous unsurveyed, unpatented claims in the northern part of the eastern half of the map-area. The claim group covers areas that were previously held by Canabel Syndicate 1957, Burrex '59 Syndicate in 1959 and Kennco Exploration Company Limited in 1971. The property was in good standing on December 31st, 1981.

Heron Lake Occurrence (Canabel Deposit)

In 1957 Canabel Syndicate carried out trenching on their deposit of argentiferous galena located about 305 m east of the southern end of Heron Lake in the northwestern part of the eastern half of the map-area. In the same year a ground electromagnetic survey was carried out by McPhar Geophysics Limited for the syndicate between Heron Lake and Southpine Lake as a follow-up to an airborne electromagnetic survey carried out in the area in 1956 by Aerophysics Limited. This was followed by a geological survey by Canabel Syndicate in the same year (1957) during which time surface prospecting was carried out. Three main sub-parallel, east-trending conductive zones were located and sulphide mineralization consisting of pyrite, pyrrhotite, sphalerite and galena, locally massive, was associated with one of them. This was followed by diamond drilling of the anomalies in 1958 when 4 holes totaling 305.1 m in length were drilled by Valmont Mining Exploration Limited. Assay results from the core returned best assays of 0.67% zinc over 0.55 m and 0.20% silver over 0.48 m (Resident Geologist's Files, Ontario Ministry of Northern Development and Mines, Thunder Bay).

Graphite Lake Occurrence

In 1959 Burrex '59 Syndicate carried out ground self-potential and dip-needle magnetic surveys and prospecting at Graphite Lake (local name) at Mile 20 on Kimberly-Clark of Canada Limited road, 2.5 km southeast of Southpine Lake. A number of east-trending anomalies were found along with associated pyrite, pyrrhotite, graphite and molybdenum mineralization. In 1971 Kennco Explorations (Canada) Limited commenced a combined airborne electromagnetic and airborne magnetic survey carried out by Lockwood Survey Corporation, in the region lying between Southpine Lake, Stingray Lake and Aguasabon Lake in the northeastern part of the map-area. Four anomalies were located which were considered to "warrant strong consideration for further investigations..." (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay). Two of these were associated with magnetic anomalies, of a magnetic intensity not so great as to suggest oxide iron formation. These were interpreted to "contain significant amounts of pyrrhotite and therefore occur in a sulphide-bearing environment which may contain values in economic metals" (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay). In the fall of 1971 this airborne geophysical survey was followed up by ground electromagnetic and ground magnetic surveys carried out by Geoscience Consultants Limited for Kennco Explorations (Canada) Limited. The purpose of this work was to locate on the ground the conductors indicated by the airborne survey and to aid geological interpretation of the areas explored geophysically. In the region 2.4 km southwest of Stingray Lake, at Graphite Lake (local name) eight conductors were found trending parallel to the rock units. Of the eight conductors only one was classified as a good conductor in the company reports. Five diamond drill holes were recommended to test the conductors.

Current geological mapping has shown that all the anomalies encountered were located in Quetico metasediments in the contact zone between the Quetico metasediments and Abitibi metavolcanics.

Rolac Mines Limited (57)

In 1980 Rolac Mines Limited held two contiguous patented claims TB 3588 and TB 3589 located about 3 km southeast of Schreiber on the south side of the C.P.R. tracks. The claims were in good standing on December 31st, 1980.

No exploration work is on file for the property and no evidence of past exploration activity was observed during the current survey. Current mapping has shown that the property is underlain by intermediate metavolcanic rocks of the lower metavolcanic cycle, and mafic metavolcanic rocks of the upper cycle intruded by a quartz-feldspar porphyry dike.

Sand Lake Occurrence (58)

This occurrence is located near the eastern shore of Sand Lake, half-way between Mile 8 and Mile 9 on the Kimberly-Clark of Canada Limited road. It was discovered by the field party during the current survey on open ground.

The deposit occurs in a creek draining the eastern shore of Sand Lake. It consists of a pod of massive, banded pyrite and pyrrhotite which is 1.5 m wide and 1 m long, strikes E 47° S and appears to dip vertically. The pyrite and pyrrhotite are accompanied by chert which shows microfolding. The occurrence of banding in both the chert and the sulphides, the presence of microfolded chert and the absence of pervasive alteration, suggest that the deposit is a chemical sediment.

A grab sample collected during the current survey and analyzed by the Geoscience Laboratories, Ontario Geological Survey, Toronto, contained 50 ppm Cu, 135 ppm Zn, trace Pb, 28 ppm Ni and 45 ppb Au.

Town of Schreiber (59)

The Town of Schreiber is recorded as holding one surveyed, patented claim TB 4877 during 1979, and on December 31st, of that year.

No exploration work is on file for the claim but current mapping shows it to be underlain predominantly by intermediate aphanitic metavolcanics, associated with intermediate porphyritic flows and basalt. The Schreiber Point Fault, which trends north-northeasterly, crosses the claim in the southeasterly corner where granitic rocks are believed to underlay the area.

Selco Mining Corporation Limited (1979) (60)

In 1979 Selco Mining Corporation Limited held a block of six contiguous unsurveyed and unpatented mining claims at Southpine Lake in the northwestern corner of the eastern half of the map-area. The claims were not in good standing on December 31st, 1981.

Exploration work consisted of a ground electromagnetic and magnetic survey early in 1979 followed by the drilling of one diamond drill hole for a length of 111.86 m in the same year. This work was done over the western half of Southpine Lake, entirely within Quetico metasediments 2 km north of the Quetico-Abitibi Subprovince boundary. Two parallel east-southeasterly-trending conductors were defined both associated with magnetic responses. A magnetic high was also located which was interpreted by company geologists as likely being associated with a lithological change. Owing to a lack of outcrop in the area current mapping could not confirm or deny this. The northernmost conductor was tested by a diamond drill hole 111.86 m in length. Pyrite and graphite were encountered associated with metasediments at the end of the hole. Gneiss and apparently amphibolite were also intersected in the drilling. No further follow-up surveys were recorded.

G.E.W. Singleton (61)

In 1979 G.E.W. Singleton held two, contiguous surveyed patented claims TB 3257 and TB 4143 located about 1.5 km from the centre of Schreiber. The claims were in good standing on December 31st, 1979.

No exploration work is filed for this claim but current mapping shows it to be underlain predominantly by aphanitic intermediate metavolcanic rocks and minor hornblende granitic rocks in the northwestern and northeastern corners of claim TB 3527.

L.G. Small (62)

In 1979 L.G. Small held one surveyed patented claim, No. E. 197 bordering the C.P.R. track on the south at the southwestern end of Schreiber. The claim was in good standing on December 31st, 1979.

No exploration work is filed for the property but current mapping shows it to be underlain by interlayered metavolcanics and metasediments in the northwestern part, and probably granitic rocks in its southeastern part. The granitic rocks are in faulted contact with the supracrustal rocks.

Dr. H. Spacek (63)

In 1979 Dr. H. Spacek held one surveyed patented claim numbered Z. 89 near Schreiber Point at the southwestern part of the Schreiber Peninsula 4.5 km southwest of Schreiber. The claim was in good standing on December 31st, 1979.

No exploration work has been filed for the property but current mapping has shown that the western two-thirds of the claim is underlain by mafic and intermediate metavolcanics, intruded to the east by hornblende syenitic rocks.

I.G. Spicer (64)

In 1979 and 1980 I.G. Spicer held three surveyed patented claims in the map-area. These were TB 3781 and TB 3782 forming a group of two contiguous claims on the southern end of the Schreiber Peninsula about 3 km south-southwest of Schreiber, and one claim TB 5420 locate 1.5 km southeast of Schreiber. The claims were in good standing on December 31st, 1979 and December 31st, 1980 respectively.

No record of exploration work has been found but the two claims on Schreiber Peninsula are underlain by northwesterly-trending mafic and intermediate metavolcanic rocks intruded by diorite or gabbro and northwesterly-trending diabase dikes. The claim located southeast of Schreiber is underlain entirely by pillowed mafic metavolcanic rocks.

United Montauban Mines Limited (1954) (65)

In 1954 United Montauban Mines held 54 claims surrounding the eastern part of Big Duck Lake, about half of which were located in the northwestern part of the eastern half of the map-area at the southeastern end of Big Duck Lake. The claims were not in good standing on December 31st, 1981.

Exploration work carried out by the company in 1954 consisted of a ground electromagnetic survey. Twelve conductors were discovered on the property, three of which are in the map-area. The trend of two of these was northeasterly, the third easterly. It was concluded by the company that because of the shallow depth and low electrical magnitude of the conductors, no important base metal sulphide deposits could be expected. It was believed by company geologists that the conductors were most probably caused by shear or contact zones containing at best disseminations of sulphides over widths of 10 feet (3 m) or less. One of the conductors located in the map-area was believed by company geologists to represent a dike. However it was believed by these geologists that because of the mineralization, characteristic of the area, some of the conductors would warrant further investigation for their gold content. It was therefore recommended that geological investigation by trenching be carried out. No further exploration work is on record for the property.

Univex Exploration and Development Corporation Limited (66)

In 1970 Univex Exploration and Development Corporation Limited held twenty unsurveyed, unpatented claims and an additional six similar-status optioned claims located in an area centred about 4.5 km southeast of Schreiber. The claims were not in good standing on December 31st, 1979.

The area covered by the claims lies at the southwestern end of the Terrace Bay Batholith. The northwestern part of the claim group straddles the granitic-supracrustal rocks boundary. The latter comprise mafic and intermediate metavolcanic rocks and an interlayered unit of metasediments. In 1969 a ground magnetometer survey was carried out over the property by the company, to aid geological mapping. The survey indicated that the magnetic response "was found to be due primarily to the various grades (sic, phases) of granite underlying the area, numerous diabase dikes and the high pyrrhotite content of the main showing" (Resident Geologist's Files Ontario Ministry of Northern Development and Mines, Thunder Bay). This main occurrence is located on the current property of T. Noble (48). In 1970 one diamond drill hole was drilled in the northeastern part of the claim group for a total length of 335.0 feet (102 m). This was followed later in the same year by a humus copper-molybdenum geochemical survey. Four molybdenum and four copper geochemical anomalies were located. Diamond drilling was recommended to test these anomalies but no record of such projected work is on file.

Von Lake Occurrence (67)

This deposit occurs on crown land, 2.5 km northeast of Schreiber at Von Lake and was located during the current mapping where fine-grained disseminated mineralization was observed in a rusty, limonitic shear zone 1.8 m wide and 18 m long, striking N 60° E. The shear zone is in a fault juxtaposing mafic and intermediate metavolcanic rocks in an area underlain predominantly by mafic metavolcanic rocks. A grab sample of the material collected during the current survey and assayed by the Geoscience Laboratories, Ontario Geological Survey returned a value of 0.02 ounce gold per ton.

H.D. Weaver (68)

In 1979 H.D. Weaver held one surveyed patented claim at Mount Gwynne in the south-central part of Schreiber Peninsula about 3.5 km south of Schreiber. The claim was in good standing on December 31st, 1979.

No exploration work has been found on record for the claim but current mapping has shown that the claim is underlain by pink hornblende syenite, a grey hornblende monzonite or diorite that forms the peak of Mount Gwynne and minor intermediate metavolcanics.

Western Ontario Mines Limited (69)

In 1980 Western Ontario Mines Limited held one surveyed patented claim TB 4033 located about 1.75 km southeast of Schreiber. The claim was in good standing on December 31st, 1980.

No exploration work is on file for the property but current mapping has shown that it is underlain by pillowed, mafic metavolcanic rocks.

Worthington Bay No. 1 Occurrence (70)

This deposit occurs on open ground on the northwestern shore of Worthington Bay about 5.25 km south-southeast of Schreiber. It was located by the field party during the current mapping and consists of a 1.8 m wide by 12 m long shear zone trending N 40o E in pink hornblende syenitic rock, mineralized with massive chalcopyrite and pyrite. No evidence of exploration activity was observed on the occurrence. A grab sample of the mineralized material collected during the current survey and analyzed by the Geoscience Laboratories, Ontario Geological Survey, yielded 0.03 ounce gold per ton and 1.90% copper.

Worthington Bay No. 2 Occurrence (71)

This deposit was located on open ground by the field party during the current survey, on the northeastern shore of Worthington Bay about 6 km south-southeast of Schreiber. The deposit consists of an irregular mineralized zone of massive pyrite, chalcopyrite and secondary malachite in a 9 m wide diabase dike striking N 80° E intruding pink coarse-grained hornblende syenite. A grab sample of this mineralized material was assayed by the Geoscience Laboratories, Ontario Geological Survey and yielded <0.01 ounce gold per ton, 2.76 ounce silver per ton, 1.09% copper, 36 ppm nickel and 14 ppm cobalt. No evidence of exploration activity was observed.

Recommendations for Future Mineral Exploration

Base-metal mineralization

Three types of environments are recommended for massive-sulphide base metal mineralization as a result of current mapping: i) the exhalative sulphide-facies ironstone zone occurring at the junction of the lower and upper metavolcanic cycles and similar ironstone units interlayered with metavolcanic rocks within the two cycles; ii) areas of coarse felsic lapilli-tuff occurring in the upper cycle located in the east-central part of the map-area immediately east of Ducell and Rhumly Lakes; and iii) along the boundary of the Abitibi-Quetico Subprovinces near the north-central edge of the map-area especially in the southeastern region of Heron Lake for reasons explained in the following paragraphs.

In the first of the areas mentioned pyrite and pyrrhotite mineralization occurs associated with minor chalcopyrite and silver mineralization (see Property No. 33) in a zone occurring at the junction of the two volcanic cycles stretching from Walker Lake to the northwestern boundary of the Terrace Bay Batholith at a point 2 km southwest of Hays Lake in the south-central part of the map-area. Pyrite and pyrrhotite mineralization was observed throughout the zone and therefore the whole length of the unit should be examined. Base metal massive sulphide lead-zinc-copper mineralization occurs (see Property No. 33) in interflow metasediments in the area about 2 km southwest of Big Bruin Lake in the upper metavolcanic cycle. In this area oxide-facies ironstone units occur interlayered with mafic tholeiitic metavolcanic rocks. This area has the greatest concentration of ironstone interflow units and therefore should receive the most attention.

In the second of the three areas mentioned above the felsic fragmental rocks are interlayered with intermediate fragmental metavolcanics and mafic flows. This general area has many associated aeromagnetic anomalies, and massive pyrite, pyrrhotite bodies were located during the current survey in the mafic metavolcanic rocks near the southeast shore of Ducell Lake and near the east shore of Sand Lake (see Property No. 58) the latter lying between Miles 8 and 9 on the Kimberly-Clark of Canada Terrace Bay-Longlac Road.

In the third area recommended, deposits of copper - lead - zinc - silver occur associated with pyrite and pyrrhotite in the Quetico metasediments at Heron Lake (see Property No. 56); with pyrite, pyrrhotite and graphite at Graphite Lake (local name) at Mile 20 on the Kimberly-Clark of Canada Limited, Terrace Bay-Geraldton road (see Property No. 56); and with pyrite - pyrrhotite - chalcopyrite mineralization at a point 200 m beyond the eastern part of the boundary near Owl Lake (see Property No. 13). Current mapping has outlined the Abitibi-Quetico Subprovince boundary in the northern part of the map-area. Furthermore two strong aeromagnetic anomalies occur centred 2.5 km and 2.00 km, respectively, north of this boundary, in the area of the confluence of the Aguasabon River and Aguasabon Lake and north of the occurrence near Owl Lake. One of these aeromagnetic anomalies occurs over an area underlain by granitic rocks, the other, the more easterly, lies over an unmapped area. Neither of these anomalies has, as yet, a geological explanation. As some of these granitic rocks located within the Quetico metasediments north of the Subprovince boundary show evidence of derivation by migmatization from these sediments, the deposits close to the Quetico-Abitibi Subprovince boundary occurring in such granitic rocks could possibly represent tectonically transported volcanogenic base-metal deposits originally formed within the Abitibi metavolcanic sequence, but subsequently tectonically incorporated into the metasedimentary zone, with the host rocks subsequently migmatized to granitic rocks.

Gold Mineralization

Seven gold occurrences are associated with shear zones cutting the metavolcanic rocks of the upper cycle and six are associated with shears adjacent to and within the Terrace Bay Batholith. Exploration for gold should be directed to a study of these shear zones.

The shear zones in the mafic metavolcanic contact strain aureoles around the granitic batholiths trend northwesterly and northeasterly and are parallel to prominent lineament trends in these metavolcanic rocks. These auriferous shears are plotted on the rose diagram in Figure 18 on which the trend of the Hays Lake fold axis is shown. The diagram shows the two prominent directions of shearing oriented at an angle of 90 degrees to each other. The fold axis trends 100°, and is symmetrically related to the shear directions. This suggests that the shearing and folding could be related to the same compressional process giving rise to the Hays Lake syncline. Of the two conjugate shear directions, the diagram shows that the northwesterly trend is the better developed, and may be of greater economic significance. Thus these shears and lineaments are believed by the author to be associated with the deformation causing the folding in the supracrustal rocks as the axial trace of the folding approximately bisects the angle between these shear directions. These lineaments have been shown on the map face. Following this detailed lineament survey a geochemical, stream-sediment survey should then be carried out in the known mineralized areas using pathfinder elements (e.g. arsenic) to detect gold. A stream sediment survey is recommended as many of the lineaments are followed by streams. Current mapping has also shown many of these linears are shears and two new areas were found to be mineralized during the current survey. One of these occurrences (Aguasabon River No. 1 Occurrence, Occurrence No.6) is located in the east-central part of the map-area 1 km west of Mile 4 on the Kimberly-Clark of Canada Limited road where it occupies a northeast shear. It yields 0.01 ounce gold on analysis by the Geoscience Laboratories, Ontario Geological Survey. The other is a shear zone, in a northeastly-trending fault (Von Lake Occurrence, Occurrence No. 67) located in the south-central part of the map-area at Von Lake. This deposit yielded 0.02 ounce gold per ton on assay by the Geoscience Laboratories, Ontario Geological Survey.

Four of the six gold deposits occurring adjacent to and within the Terrace Bay Batholith occur in the metavolcanic rocks along the boundary of the batholith. These occurrences are found in shears and veins concentric with the contact of the batholith where they occur. Of the two gold occurrences located within the Terrace Bay Batholith, one occurs within 200 m of the contact (Gale Prospect, Property No. 20), and the other, the Worthington Bay No. 1 Occurrence (Occurrence No. 70) occurs in a northeast-trending shear zone within the batholith. Figure 19 is a rose diagram of shears adjacent to and within the Terrace Bay Batholith, along with the trend of the boundary of the batholith. The diagram shows that shearing directions straddle this boundary and suggests that the shearing is related to deformation associated with intrusion of this batholith. The axis of this batholith is also northeasterly (Figure 17). It is therefore recommended that a zone 500 m wide on either side of the boundary of the Terrace Bay Batholith be prospected for gold deposits in shear zones.

Nickel-Copper Mineralization

Exploration for nickel-sulphide mineralization in the map-area should be confined to the gabbroic intrusions and the immediately adjacent granitic rocks which have been delimited during the current survey. This type of mineralization, in the one area where it occurred, at the Nicopor Occurrence (Property No. 55) is associated with magnetite and magnetic pyrrhotite. Magnetic surveys should first be carried out to indicate mineralized gabbroic bodies, and such bodies should then be mapped in detail to recognize zones of alteration within them. Such magnetic surveys are necessary as alteration, which is associated with the mineralized zone at the Nicopor Occurrence, was not readily apparent within the body.

Molybdenum-Copper Mineralization

Vein-type molybdenum-copper mineralization is spatially related to the contact zones of the Crossman Lake and Whitesand Lake Batholiths, and also to the contact zones and interior parts of the Terrace Bay Batholith, predominantly in its southwestern part. The mineralized areas are associated with aplite and pegmatite dikes and irregular pegmatite bodies. The contact zones of these granitic bodies have been outlined by the current mapping and exploration for such veins should be concentrated in those parts of the contact regions intruded by pegmatitic and aplitic bodies. The contact region between the Crossman and Whitesand Lake batholiths in the northwestern part of the map-area seems specially favourable for this kind of mineralization and the contact zone as mapped should receive prospecting attention. Detailed mapping should be carried out over the Terrace Bay Batholith to locate areas intruded by pegmatites and aplites, supplemented by biogeochemical surveys described by Wolfe (1976) of the areas to the northeast underlain by sand.

Silver Mineralization

Silver is associated with calcite veins in fractures occurring in calcalkalic dacites and andesites and in diabase dikes.

With respect to these fracture-filling veins no pattern has been recognized. The deposits appear to be restricted to the above lithologies and as the largest body of such rocks is exposed to the southeast of Schreiber in the eastern half of the Schreiber Peninsula, detailed prospecting should be carried out in this area. As is the case for gold, a photo-lineament survey should first be done to select favourable areas, as the silver veins are located in fractures.

Silver deposits in the diabase have been found in two approximately east-west trending dikes, intruding the calc-alkalic rocks mentioned above and granitic rocks of the Terrace Bay Batholith. Both occurrences are located southeast of Schreiber. Current mapping shows a marked concentration of these east-west trending dikes in the area south of Schreiber, especially on Schreiber Peninsula. It is recommended that these dikes be prospected for silver mineralization concentrating activity in those parts of the dike where quartz-carbonate veining and pyrite mineralization occur.

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APPENDIX 1

CHEMICAL ANALYSIS OF ALL VOLCANIC ROCKS FROM THE SCHREIBER-TERRACE BAY AREA

MAJOR OXIDE LISTINGS

	NN13-2	NN14-8	QQ10-6	QQ14-104	QQ14-105	RR7-102
SIO2	50.00	82.10	63.00	52.50	53.20	54.60
TIO2	2.03	0.19	0.68	1.29	1.15	0.89
AL2O3	14.20	9.96	16.20	15.40	15.00	16.80
FE2O3	3.10	0.36	1.21	2.10	2.75	1.48
FEO	11.60	0.50	5.08	9.73	8.15	5.66
MNO	0.17	0.02	0.11	0.29	0.32	0.13
MGO	5.38	0.28	2.19	6.31	5.59	5.28
CAO	9.93	1.10	3.84	7.08	7.39	6.94
NA2O	2.79	3.08	2.76	2.44	1.48	4.29
K2O	0.10	1.27	4.12	0.87	1.59	1.15
P2O5	0.23	0.03	0.12	0.04	0.01	0.28
CO2	0.04	0.77	0.14	0.69	0.53	0.57
S	0.02	0.32	0.09	0.43	0.45	0.01
H2O+	0.66	0.38	1.10	1.10	1.72	1.97
H2O-	0.23	0.25	0.32	0.26	0.40	0.36
LOI	0.20	1.50	1.20	1.20	2.20	2.60
TOTAL	100.48	100.61	100.96	100.50	99.70	100.41

	SS4-25	SS4-28	79MWC-0001	79MWC-0002	79MWC-0003	79MWC-0004
SIO2	68.10	71.10	39.90	54.80	56.10	51.40
TIO2	0.39	0.29	0.72	1.23	1.67	0.84
AL2O3	16.40	16.20	9.48	13.30	16.10	13.90
FE2O3	0.54	0.34	6.70	3.40	2.57	2.69
FEO	2.33	1.66	26.60	10.10	7.32	8.65
MNO	0.06	0.04	1.41	0.20	0.15	0.19
MGO	1.90	1.53	5.43	5.20	3.94	7.49
CAO	2.45	1.88	5.95	8.16	4.63	10.10
NA2O	4.75	3.07	0.97	2.56	4.54	2.30
K2O	0.98	2.18	0.08	0.65	1.05	0.64
P2O5	0.10	0.07	0.01	0.05	0.31	00.00
CO2	0.55	0.23	0.31	0.19	0.20	0.22
S	0.02	0.03	0.36	0.08	0.02	0.03
H2O+	1.45	1.35	2.01	0.64	1.36	0.50
H2O-	0.35	0.25	0.24	0.19	0.08	0.24
LOI	2.20	2.10	0.60	0.80	1.00	1.10
TOTAL	100.37	100.22	100.17	100.75	100.04	99.19

	79MWC-0005	79MWC0005D	79MWC-0006	79MWC-0007	79MWC-0008	79MWC-0009
SIO2	63.70	62.90	63.20	65.00	77.60	78.10
TIO2	0.67	0.66	0.60	0.97	0.19	0.21
AL2O3	19.00	19.20	15.40	16.50	11.90	11.80
FE2O3	0.51	0.59	1.55	0.41	0.46	0.34
FEO	3.24	3.16	3.83	3.41	2.00	1.25
MNO	0.12	0.12	0.09	0.08	0.06	0.04
MGO	1.01	1.03	2.73	2.50	2.06	0.37
CAO	3.40	3.38	4.15	1.87	0.20	1.33
NA2O	3.35	3.13	3.55	3.67	0.57	3.73
K2O	2.47	2.45	1.94	2.80	2.37	1.15
P2O5	0.01	0.01	0.04	0.16	00.00	00.00
CO2	0.49	0.48	1.39	0.61	0.15	0.53
S	0.06	0.06	0.10	0.01	0.01	0.01
H2O+	1.52	1.55	1.19	1.57	1.62	0.38
H2O-	0.15	0.13	0.29	0.10	0.14	0.18
LOI	2.30	2.20	3.10	2.80	2.20	1.30
TOTAL	99.70	98.85	100.05	99.66	99.33	99.42

	79MWC-001A	79MWC-002A	79MWC-003A	79MWC-004A	79MWC-005A	80MWC-000
SIO2	51.20	63.20	67.80	62.40	72.70	54.90
TIO2	0.93	0.71	0.60	0.61	0.48	1.53
AL2O3	15.40	15.60	15.40	17.80	15.80	14.80
FE2O3	2.89	1.21	0.25	1.68	0.95	3.98
FEO	8.74	4.49	2.50	1.66	2.50	8.75
MNO	0.29	0.11	0.09	0.03	0.07	0.21
MGO	4.28	3.42	1.96	1.54	1.08	2.27
CAO	10.90	2.04	3.28	3.86	0.41	5.97
NA2O	2.65	2.77	4.48	4.94	0.77	3.24
K2O	0.20	2.43	1.08	1.09	2.58	0.53
P2O5	0.09	0.13	0.15	0.09	0.15	0.71
CO2	1.57	0.22	0.87	2.53	0.15	0.33
S	0.03	0.14	0.60	1.64	0.19	0.01
H2O+	1.02	2.51	1.16	1.98	2.08	1.60
H2O-	0.23	0.30	0.25	0.39	0.26	0.12
LOI	2.10	2.40	1.80	4.60	2.60	1.40
TOTAL	100.42	99.28	100.47	102.24	100.17	98.90

	80MWC-0002	80MWC-0006	80MWC-0008	80MWC-0008D	80MWC-0009	80MWC-0010
SIO2	55.90	48.00	48.90	49.00	60.90	70.20
TIO2	2.79	2.25	1.66	1.63	0.79	0.81
AL2O3	17.80	14.90	15.80	15.80	15.40	12.10
FE2O3	1.04	4.10	3.50	3.60	3.14	1.13
FEO	5.43	10.10	9.23	9.23	6.72	5.51
MNO	0.23	0.19	0.18	0.19	0.21	0.11
MGO	1.48	5.87	6.61	6.43	2.49	2.01
CAO	6.68	8.14	9.90	9.89	2.44	2.85
NA2O	2.74	2.42	1.99	2.24	2.37	1.83
K2O	1.37	0.16	0.12	0.11	1.13	0.09
P2O5	0.38	0.27	0.18	0.18	0.12	0.08
CO2	2.02	0.32	0.56	0.53	0.46	0.13
S	0.09	0.09	0.06	0.07	1.22	0.01
H2O+	1.75	3.24	1.27	1.04	3.20	2.21
H2O-	0.11	0.09	0.13	0.18	0.16	0.10
LOI	3.80	3.00	1.60	1.20	3.60	2.00
TOTAL	99.80	100.10	100.10	100.10	100.70	99.20

	80MWC-0011	80MWC-0012	80MWC-0013	80MWC-0015	80MWC-0016	80MWC-0019
SIO2	48.00	53.80	52.30	53.00	49.30	50.60
TIO2	1.04	1.40	1.18	0.91	1.24	1.26
AL2O3	13.10	15.20	15.70	14.60	14.70	14.10
FE2O3	0.94	2.80	0.88	2.05	2.20	1.80
FEO	8.34	9.23	6.89	8.42	12.20	10.90
MNO	0.18	0.20	0.22	0.18	0.20	0.22
MGO	4.06	4.77	4.02	6.71	4.48	3.93
CAO	9.62	9.75	10.60	10.90	10.40	10.90
NA2O	2.09	2.10	1.88	2.09	1.96	2.19
K2O	0.30	0.16	00.00	0.02	0.05	0.48
P2O5	0.04	0.05	0.03	0.02	0.05	0.04
CO2	7.13	0.12	3.41	0.33	1.73	1.68
S	0.03	0.08	0.02	0.03	0.05	0.09
H2O+	3.58	0.89	2.69	0.86	1.11	1.62
H2O-	0.17	0.09	0.17	0.08	0.06	0.07
LOI	10.60	0.80	6.10	1.00	2.10	2.70
TOTAL	98.60	100.60	100.00	100.20	99.70	99.90

	80MWC-0026	80MWC-0026D	80MWC-0037	80MWC-0038	80MWC-0038D	80MWC-00
SIO2	55.90	56.10	50.40	81.90	82.40	72.50
TIO2	0.87	0.94	1.51	0.24	0.21	0.56
AL2O3	15.50	15.50	14.40	11.00	11.00	14.10
FE2O3	2.74	2.62	2.10	00.00	0.10	1.07
FEO	4.05	3.97	11.00	0.89	0.81	1.86
MNO	0.11	0.10	0.21	0.01	0.01	0.04
MGO	4.83	4.85	5.78	0.13	0.15	0.68
CAO	5.44	5.33	10.30	0.59	0.62	2.13
NA2O	3.76	3.66	2.18	4.37	4.60	3.31
K2O	2.42	2.30	0.11	0.11	0.12	1.43
P2O5	0.59	0.60	0.06	00.00	00.00	0.03
CO2	1.41	1.43	0.21	0.20	0.20	0.43
S	0.03	0.03	0.10	0.05	0.05	0.21
H2O+	2.43	2.39	0.73	0.32	0.41	0.53
H2O-	0.20	0.22	0.01	0.10	0.12	0.12
LOI	3.80	3.60	0.40	0.50	0.60	1.30
TOTAL	100.20	100.00	99.10	99.90	100.80	99.00

	80MWC-0040	80MWC-0041	80MWC-0042	80MWC-0043	80MWC-0045	80MWC-004
SIO2	75.80	72.40	44.30	66.40	38.00	56.20
TIO2	0.36	0.59	2.58	0.99	0.40	1.57
AL2O3	12.90	13.20	13.90	14.10	3.33	14.10
FE2O3	1.20	1.18	2.10	1.73	7.86	2.45
FEO	2.03	1.78	12.50	3.24	3.73	8.51
MNO	0.06	0.12	0.21	0.09	0.15	0.22
MGO	0.49	0.93	5.91	1.72	34.20	4.10
CAO	0.76	2.94	6.51	1.77	1.70	6.16
NA2O	3.63	00.00	1.41	4.00	00.00	2.94
K2O	1.85	4.44	00.00	2.78	00.00	0.61
P2O5	00.00	0.04	0.32	0.11	00.00	0.08
CO2	0.45	1.29	4.57	1.96	0.12	0.38
S	0.01	0.01	0.05	0.01	0.03	0.03
H2O+	0.91	1.25	5.75	0.68	9.74	2.20
H2O-	0.08	0.18	0.07	0.28	0.49	0.34
LOI	1.20	2.90	8.70	2.80	10.60	2.10
TOTAL	100.50	100.30	100.20	99.80	99.70	99.90

	80MWC-0047	80MWC-0048	80MWC-0049	80MWC-0050	80MWC-0051	80MWC-0055
SIO2	46.40	47.30	46.10	45.40	64.00	48.10
TIO2	2.32	2.13	2.71	2.80	0.84	2.32
AL2O3	14.00	12.90	15.60	13.40	18.80	13.00
FE2O3	7.20	4.70	4.40	5.30	0.43	4.30
FEO	9.32	13.90	10.90	9.64	4.13	15.20
MNO	0.25	0.42	0.24	0.19	0.06	0.30
MGO	6.78	5.53	3.80	6.57	1.38	3.71
CAO	7.86	4.50	10.80	8.20	5.17	8.76
NA2O	2.73	1.86	2.07	1.49	2.01	0.94
K2O	1.15	0.10	0.34	00.00	1.00	0.76
P2O5	0.29	0.09	0.35	0.38	0.11	0.27
CO2	0.16	1.39	0.65	2.55	0.48	0.15
S	0.15	0.35	0.21	0.08	0.22	0.04
H2O+	1.24	4.76	0.98	4.72	1.86	1.37
H2O-	0.29	0.34	0.12	0.17	0.13	0.14
LOI	1.40	5.20	1.40	6.20	2.00	0.50
TOTAL	100.10	100.20	99.30	100.80	100.60	99.50

	80MWC-0056	80MWC-0057	80MWC-0059	81MWC-0001	✓ 81MWC0001D	81MWC-0002
SIO2	50.70	51.50	68.40	64.70	64.70	44.20
TIO2	2.54	1.12	0.82	0.62	0.58	2.26
AL2O3	17.30	14.70	14.90	15.20	15.20	15.00
FE2O3	3.38	2.20	1.52	0.64	0.83	3.78
FEO	8.75	10.60	3.00	3.30	3.31	14.40
MNO	0.34	0.22	0.07	0.07	0.07	0.41
MGO	2.24	5.15	1.04	2.42	2.37	4.68
CAO	8.70	10.40	3.92	2.98	3.01	8.92
NA2O	2.20	1.47	2.95	3.09	3.06	1.50
K2O	0.45	0.44	1.79	2.94	2.94	0.96
P2O5	0.31	0.02	0.14	0.22	0.22	0.29
CO2	0.45	0.46	0.54	1.23	1.23	0.25
S	0.12	0.02	0.03	0.03	0.03	0.08
H2O+	1.58	1.37	1.17	1.83	1.82	2.31
H2O-	0.06	0.05	0.13	0.08	0.09	0.10
LOI	1.50	1.10	1.70	2.90	3.10	1.00
TOTAL	99.10	99.70	100.40	99.40	99.50	99.10

	81MWC-0003	81MWC-0009	81MWC-0010	81MWC-0011	81MWC-0012	81MWC-001
SIO2	75.30	78.20	80.10	73.30	77.10	77.30
TIO2	0.08	0.27	0.03	0.25	0.11	0.06
AL2O3	13.60	12.50	12.00	13.10	12.50	12.40
FE2O3	0.67	0.38	0.22	0.75	0.28	0.27
FEO	0.73	0.89	0.32	1.45	0.81	0.73
MNO	0.03	0.02	0.01	0.06	0.04	0.02
MGO	0.53	0.63	0.51	0.58	0.23	0.42
CAO	0.66	1.72	0.22	1.22	1.45	1.67
NA2O	3.46	3.25	2.34	00.00	1.01	3.62
K2O	2.81	1.17	3.66	6.77	5.35	1.42
P2O5	00.00	0.06	00.00	0.04	0.01	00.00
CO2	0.33	0.07	0.10	0.66	0.49	0.31
S	0.01	0.02	0.01	0.03	0.01	0.01
H2O+	0.73	0.51	0.61	0.81	0.38	0.44
H2O-	0.08	0.08	0.08	0.14	0.07	0.06
LOI	1.00	0.60	0.90	1.40	1.10	0.70
TOTAL	99.00	99.80	100.20	99.20	99.80	98.70

	81MWC-0014	81MWC0014D	81MWC-0015	81MWC-0016	81MWC-0017	81MWC-001
SIO2	55.50	55.70	69.20	73.00	73.70	49.70
TIO2	1.49	1.46	0.61	0.09	0.58	1.27
AL2O3	16.10	15.90	12.40	14.00	13.40	14.20
FE2O3	2.50	2.02	1.41	1.38	0.24	2.20
FEO	6.29	6.37	3.47	0.81	1.05	10.70
MNO	0.16	0.16	0.15	0.03	0.09	0.24
MGO	4.29	4.32	1.36	1.71	0.34	6.68
CAO	7.86	7.81	3.88	0.33	3.83	9.86
NA2O	3.45	3.36	2.40	0.81	3.71	2.22
K2O	0.19	0.19	1.79	4.16	0.52	0.33
P2O5	0.25	0.25	0.07	00.00	0.09	0.08
CO2	0.21	0.19	1.38	0.25	0.94	0.17
S	0.02	0.02	0.14	0.01	0.01	0.01
H2O+	1.21	1.23	1.02	2.04	0.46	1.24
H2O-	0.06	0.05	0.07	0.06	0.08	0.08
LOI	0.90	0.90	2.00	2.10	1.30	0.80
TOTAL	99.60	99.00	99.40	98.70	99.00	99.00

	81MWC-0020	81MWC-0021	81MWC-0023	81MWC0023D	81MWC-0024	81MWC-0025
SIO2	79.90	50.50	49.40	48.80	49.50	47.90
TIO2	0.19	2.59	1.93	1.92	1.26	0.99
AL2O3	10.40	13.70	15.20	15.00	13.70	13.90
FE2O3	0.33	2.64	3.58	3.48	4.17	3.09
FEO	1.21	7.25	8.54	8.46	9.99	10.20
MNO	0.02	0.18	0.19	0.19	0.22	0.22
MGO	0.51	2.70	4.52	4.47	6.14	7.38
CAO	0.89	7.08	10.70	10.60	8.33	9.89
NA2O	5.09	3.29	2.60	2.82	3.41	1.94
K2O	0.32	0.91	0.60	0.58	0.93	1.20
P2O5	00.00	0.27	0.30	0.31	0.08	0.06
CO2	0.74	5.04	1.01	1.04	0.13	0.06
S	0.01	0.18	0.01	0.01	0.13	0.12
H2O+	0.10	2.75	1.13	1.20	1.63	1.76
H2O-	0.08	0.10	0.08	0.10	0.06	0.10
LOI	1.00	6.50	1.50	1.50	1.10	1.20
TOTAL	99.80	99.20	99.80	99.00	99.70	98.80

	81MWC-0026	81MWC-0028	81MWC-0031	81MWC-0032	81MWC-0036	81MWC-0037
SIO2	47.10	49.00	47.00	45.30	45.90	54.00
TIO2	1.37	1.21	1.31	2.19	1.86	1.58
AL2O3	14.90	13.00	15.00	15.50	12.60	12.40
FE2O3	2.68	2.87	4.82	5.13	5.30	3.92
FEO	9.03	10.50	8.62	10.50	9.99	11.00
MNO	0.14	0.21	0.20	0.42	0.20	0.19
MGO	9.51	7.82	6.75	3.34	6.60	3.23
CAO	9.10	9.30	9.29	11.30	10.80	9.05
NA2O	1.64	2.23	2.60	2.23	2.91	2.27
K2O	0.92	0.34	1.01	0.92	0.83	0.26
P2O5	0.28	0.10	0.07	0.29	0.02	0.16
CO2	0.11	0.08	0.29	0.16	0.10	0.20
S	0.08	0.01	0.28	0.13	0.23	0.04
H2O+	2.16	1.50	1.53	1.37	1.39	1.04
H2O-	0.07	0.07	0.11	0.10	0.07	0.06
LOI	1.70	0.70	1.50	0.80	0.70	0.20
TOTAL	99.10	98.20	98.90	98.80	98.80	99.40

	81MWC0037D	81MWC-0040
SIO2	53.70	56.40
TIO2	1.62	1.90
AL2O3	12.40	11.30
FE2O3	4.30	3.79
FEO	11.00	10.60
MNO	0.19	0.28
MGO	3.15	2.56
CAO	9.19	5.69
NA2O	2.25	3.82
K2O	0.26	0.41
P2O5	0.15	0.20
CO2	0.21	0.10
S	0.04	0.04
H2O+	1.05	1.35
H2O-	0.06	0.06
LOI	0.10	0.30
TOTAL	99.60	98.50

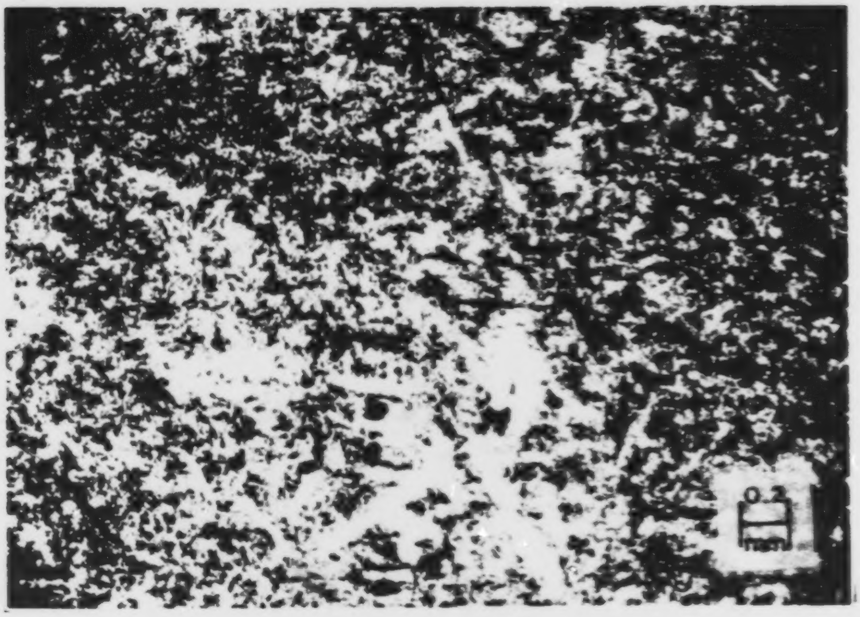


Photo 1. Photomicrograph of fine-grained tholeiitic basalt in the greenschist facies showing relict microlitic texture. Sample from outcrop 0.5 km north-northeast of Ansell Lake, in the central part of the map area.

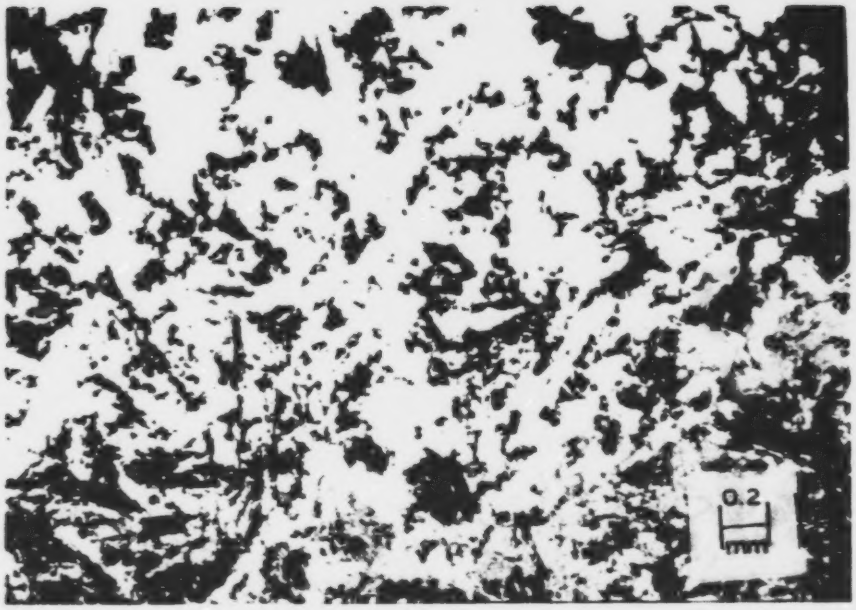


Photo 2: Photomicrograph of medium-grained tholeiitic basalts in the greenschist facies showing relict intergranular texture. Sample from outcrop 1.5 km northwest of Schreiber. Crossed polars.

Photo 3: Deformed pillows in tholeiitic basalt, from outcrop 2.5 km northwest of the northeastern end of Sox Lake, western part of map-area.

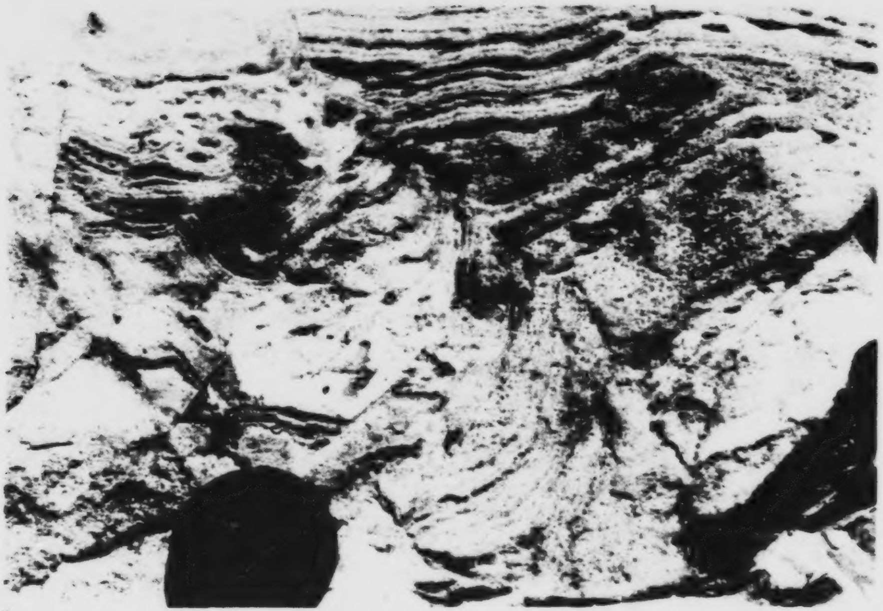


Photo 4: Soft sediment deformation in mafic tuff from outcrop on north side of Highway 17, 0.3 km east of Schreiber.

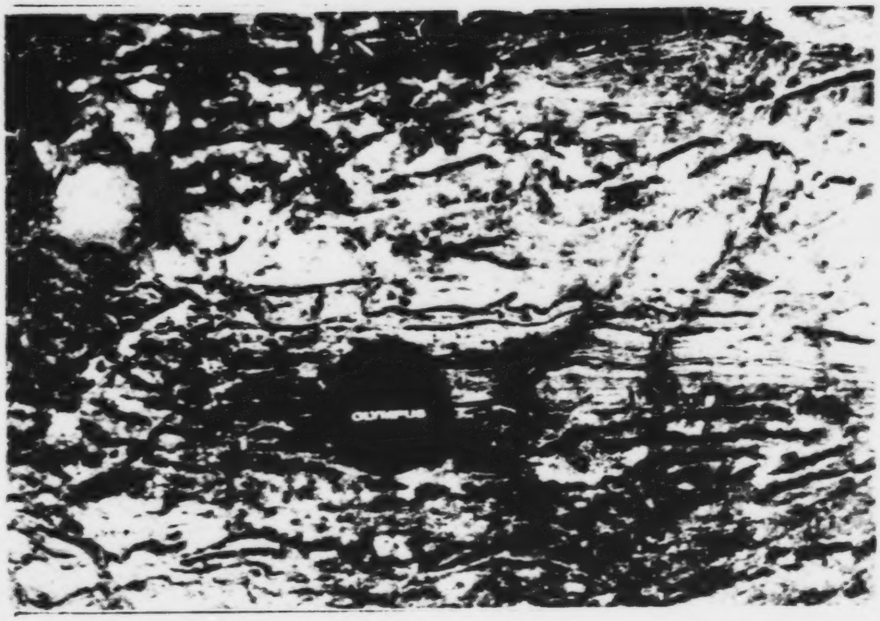


Photo 5: Flame structures in graded mafic tuff, from outcrop on north side of Highway 17, about 0.4 km southeast of Schreiber.

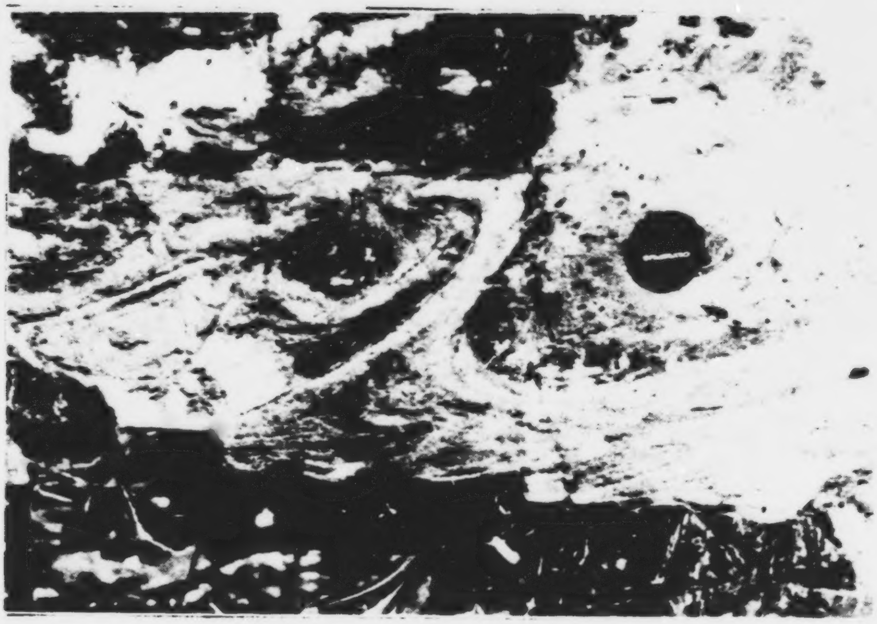


Photo 6: Detail of flame structure and load casting in mafic tuff from outcrop on north side of Highway 17, about 0.4 km southeast of Schreiber.

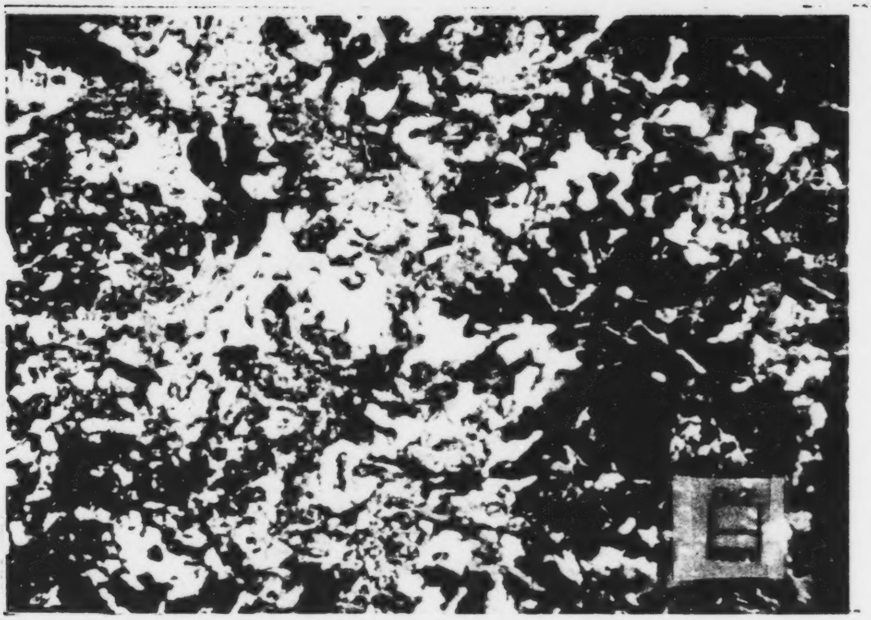


Photo 7: Photomicrograph of pyroxene-hornfels derived from tholeiitic basalt showing granoblastic texture. Sample from outcrop 80 m west of west shore of Hays Lake in the south-central part of the map-area.

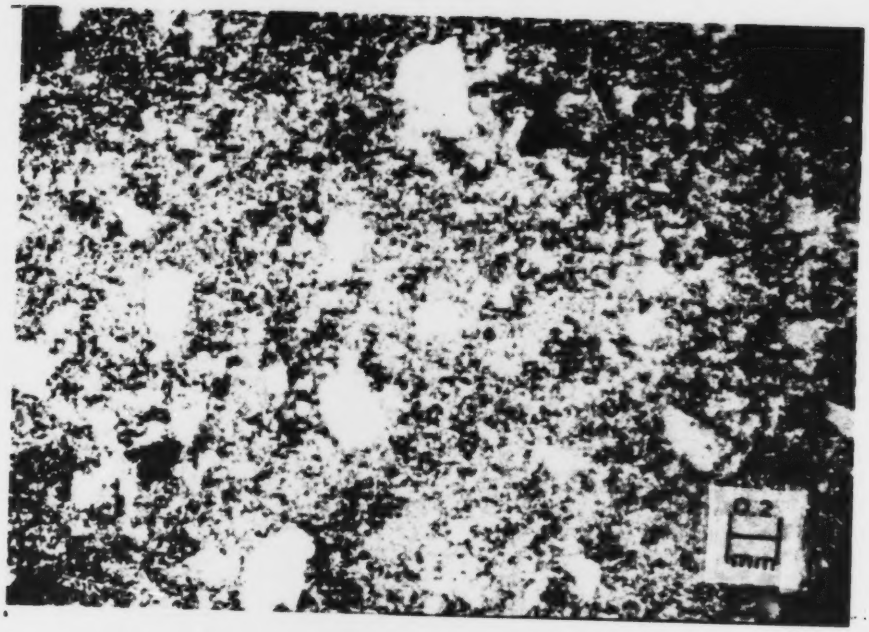


Photo 8: Photomicrograph of calkalkalic flow showing relict porphyritic-microgranular texture, greenschist facies. Sample from outcrop 2.5 km southwest of Rongie Lake, south-central part of map-area.

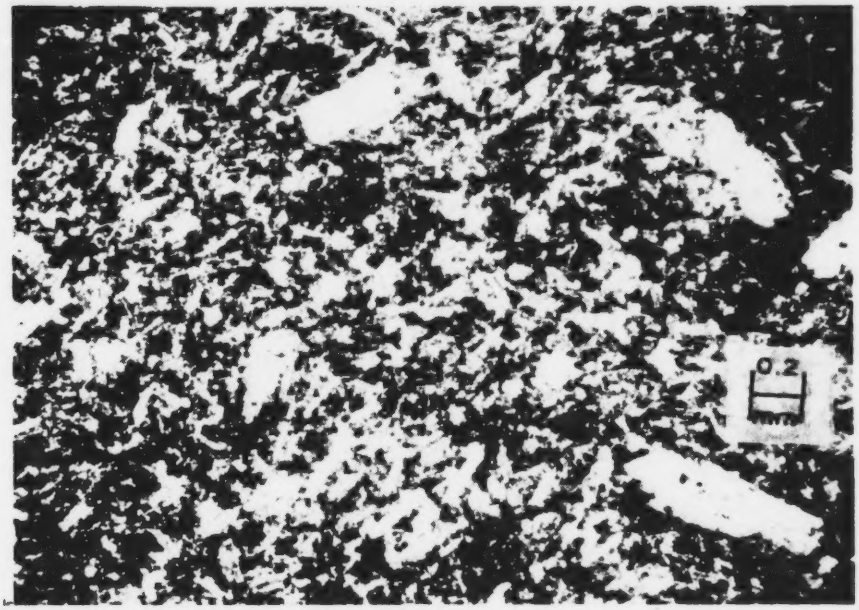


Photo 9: Photomicrograph of calkalkalic dacite in greenschist facies showing porphyritic-pilotaxitic texture. Sample from outcrop on south side of Highway 17 about 1.1 km southeast of Schreiber.

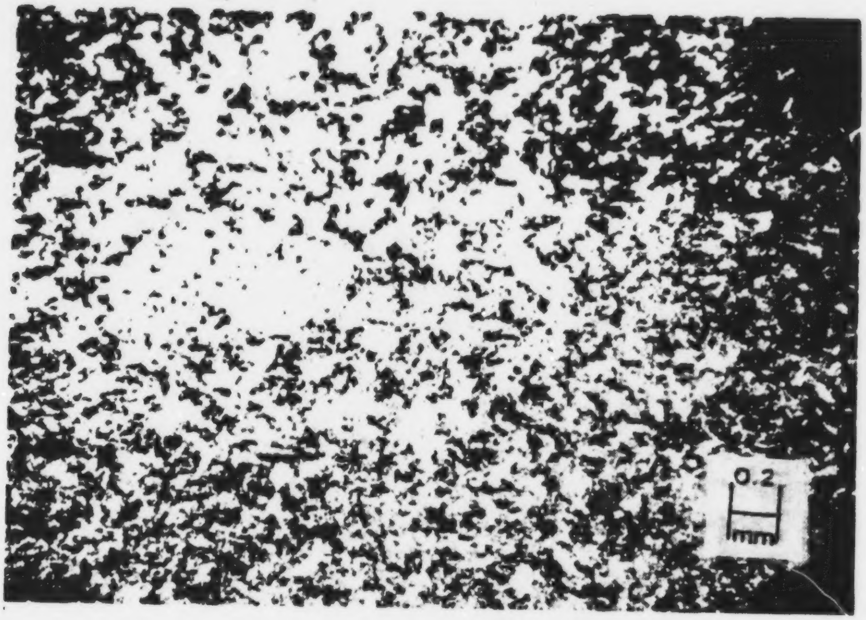


Photo 10: Photomicrograph of calkalkalic flow in greenschist facies showing porphyritic-pilotaxitic texture. Sample from outcrop 0.4 km south of southern end of Walker Lake in south-central part of map-area.

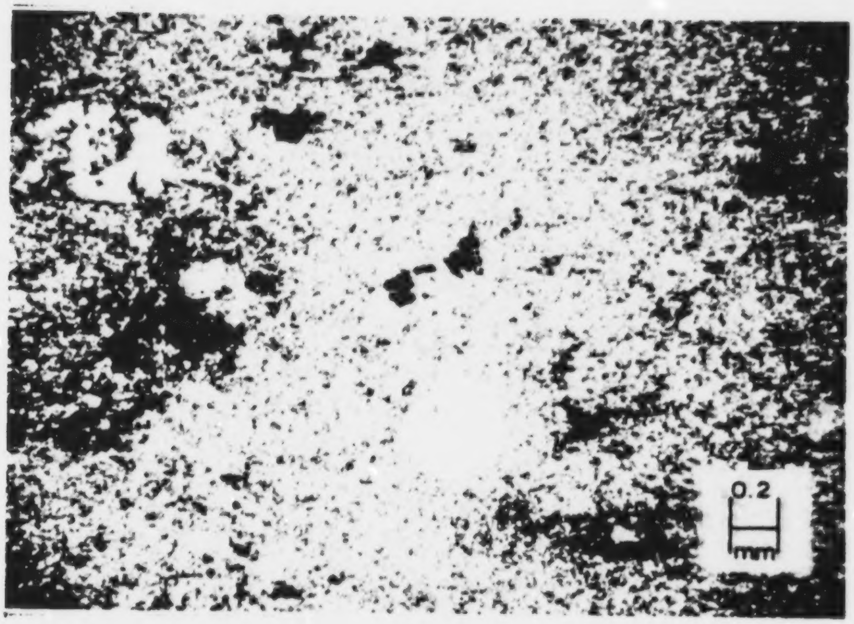


Photo 11: Photomicrograph of calkalkalic flow in greenschist facies showing porphyritic-microfelsitic texture. Sample from outcrop 1.8 km south-southwest of Fourth Lake, Schreiber Peninsula in the southern part of the map-area.

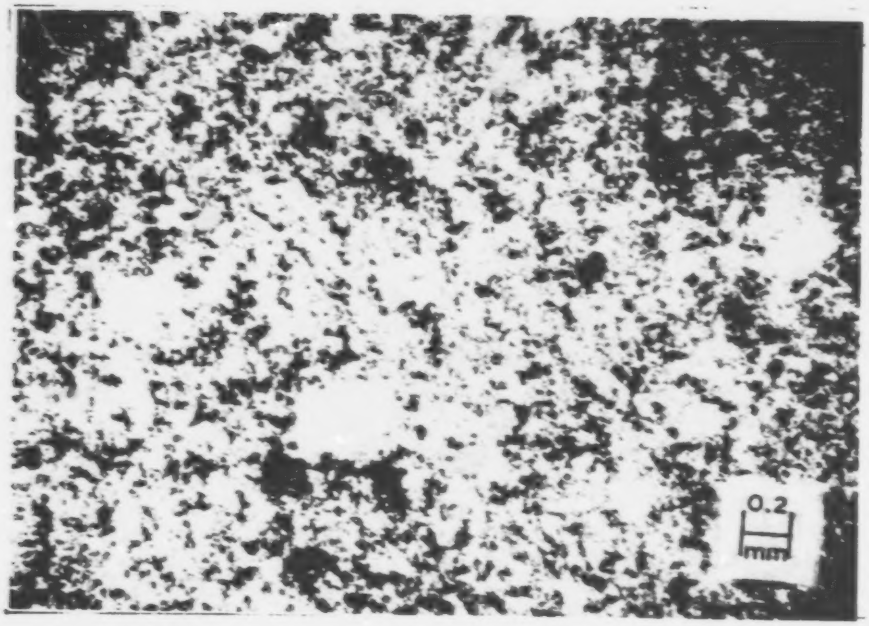


Photo 12: Photomicrograph of calkalkalic flow in greenschist facies showing porphyritic-microgranular texture. Sample from outcrop 1.5 km west of Little Bruin Lake central part of map-area.

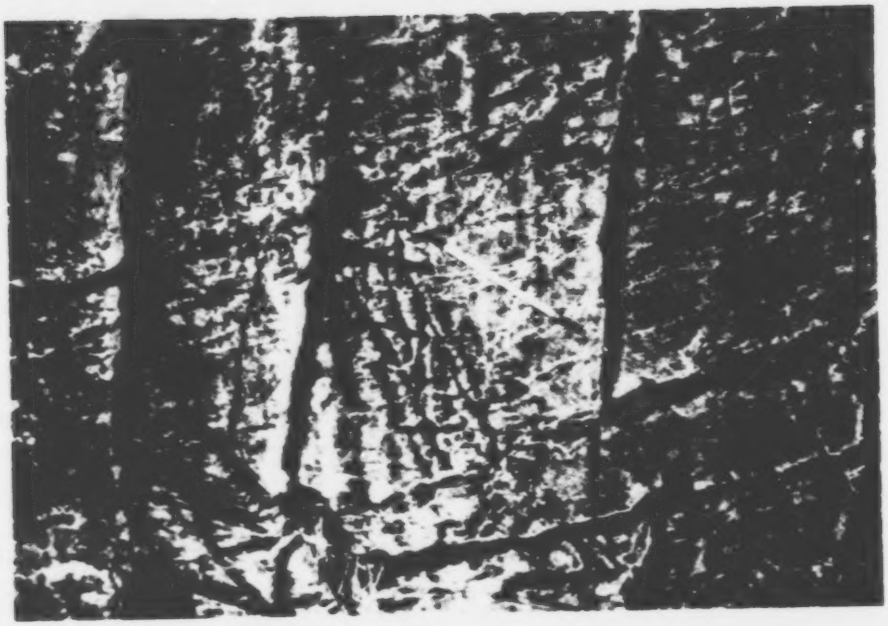


Photo 13: Serpentinite showing characteristic rectangular fracture pattern and less well-developed sheaf-like fracture pattern (lower part of photo) from outcrop on southeastern shore of Big Bruin Lake, south-central part of map area.

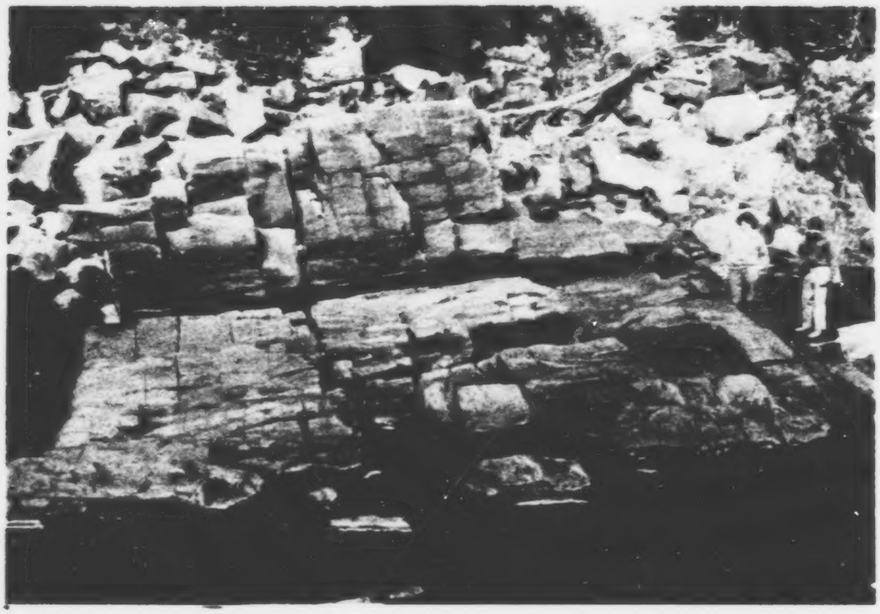


Photo 14: Diabase dike, east-west trending, showing well-developed master joints parallel to trend of dike on Lake Superior, west shore of Worthington Bay. This dike dips steeply to the east.

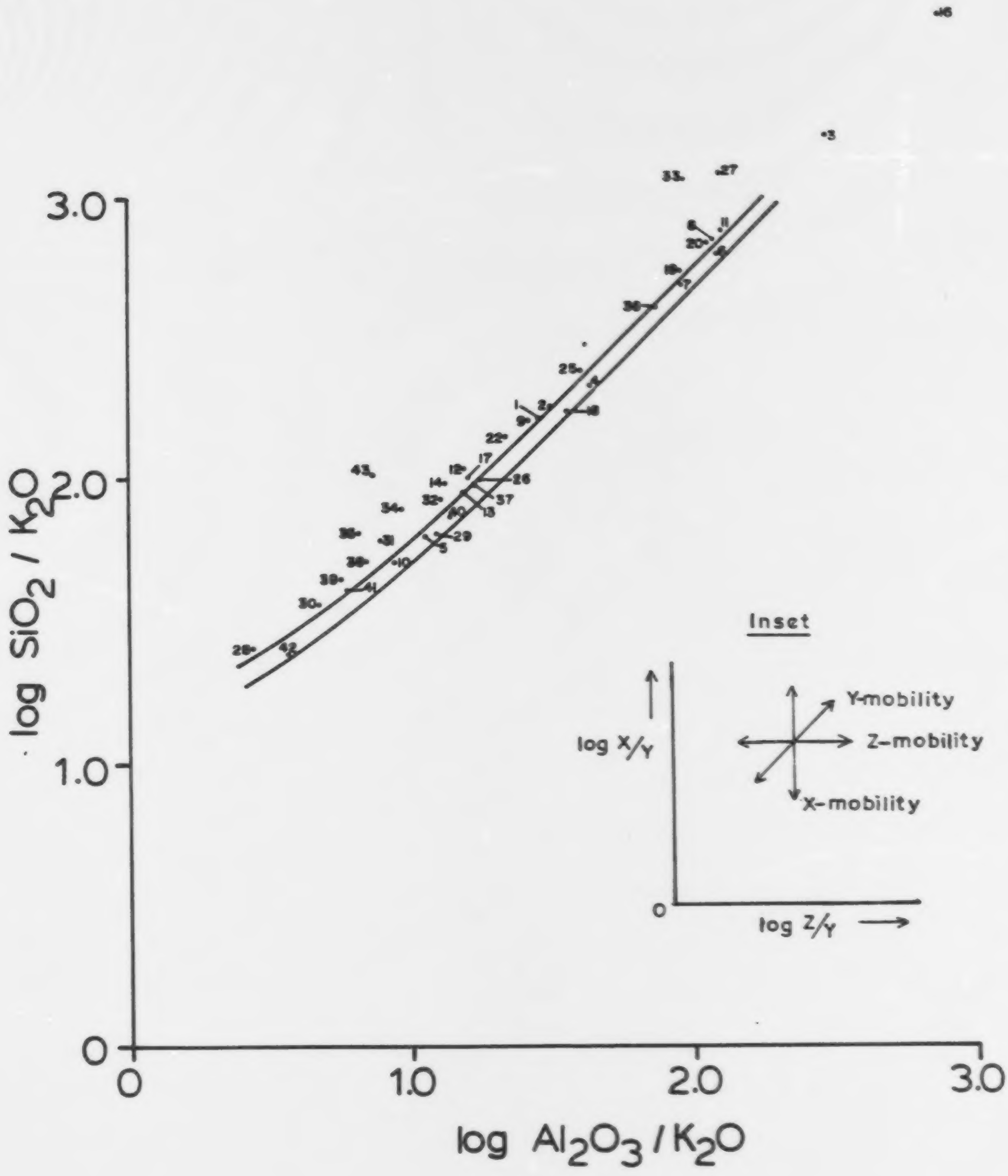


Fig. 3 - LMPR Diagram: SiO_2/K_2O vs. Al_2O_3/K_2O

FOR VOLCANIC ROCKS: SCHREIBER - TERRACE BAY AREA

Numbers on diagram correspond to sample numbers as listed in Table 2.

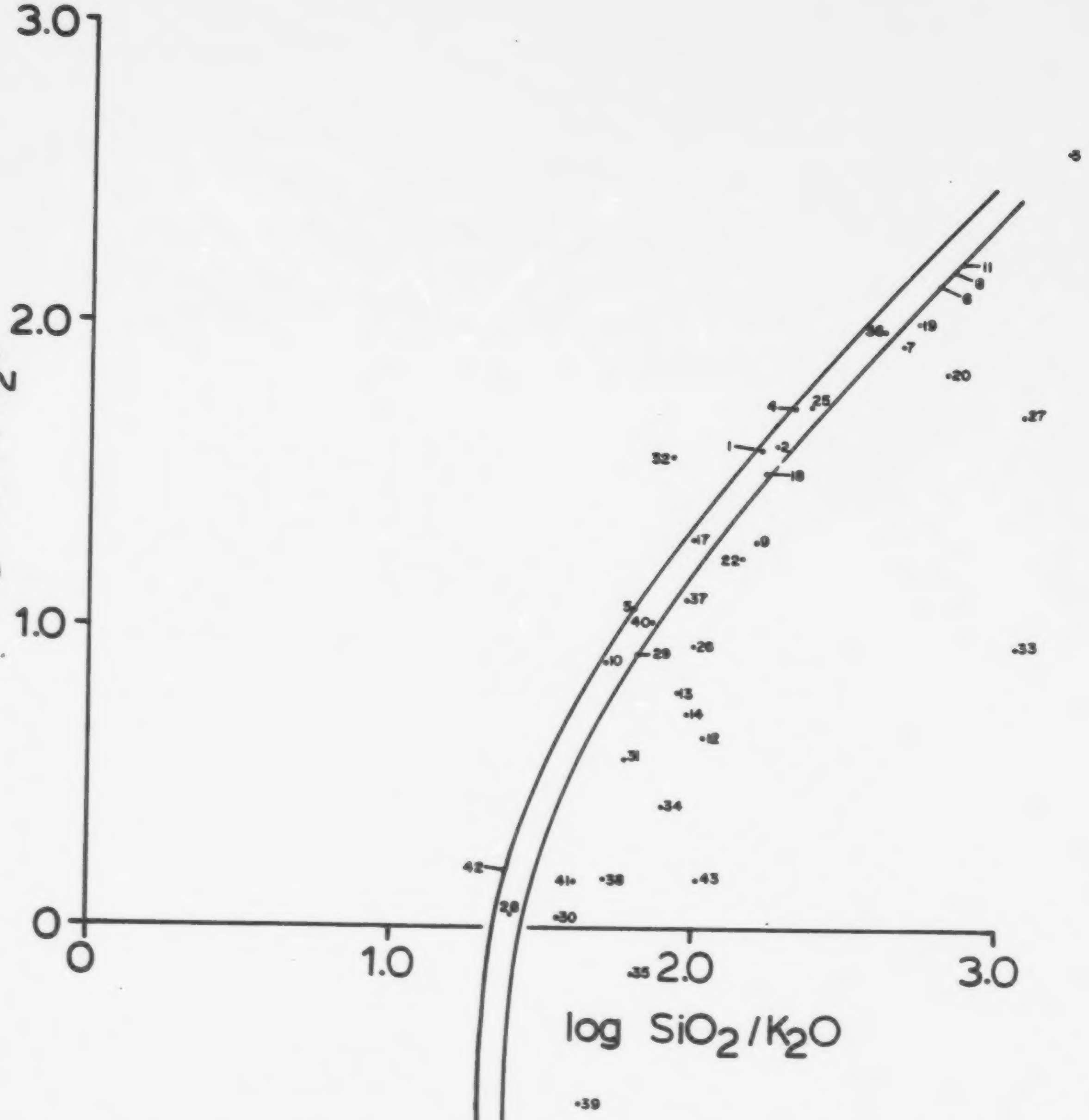


Fig. 4 - LMPR Diagram: CaO/K_2O vs. SiO_2/K_2O

FOR VOLCANIC ROCKS: SCHREIBER - TERRACE BAY AREA

Numbers on diagram correspond to sample numbers as listed in Table 2.

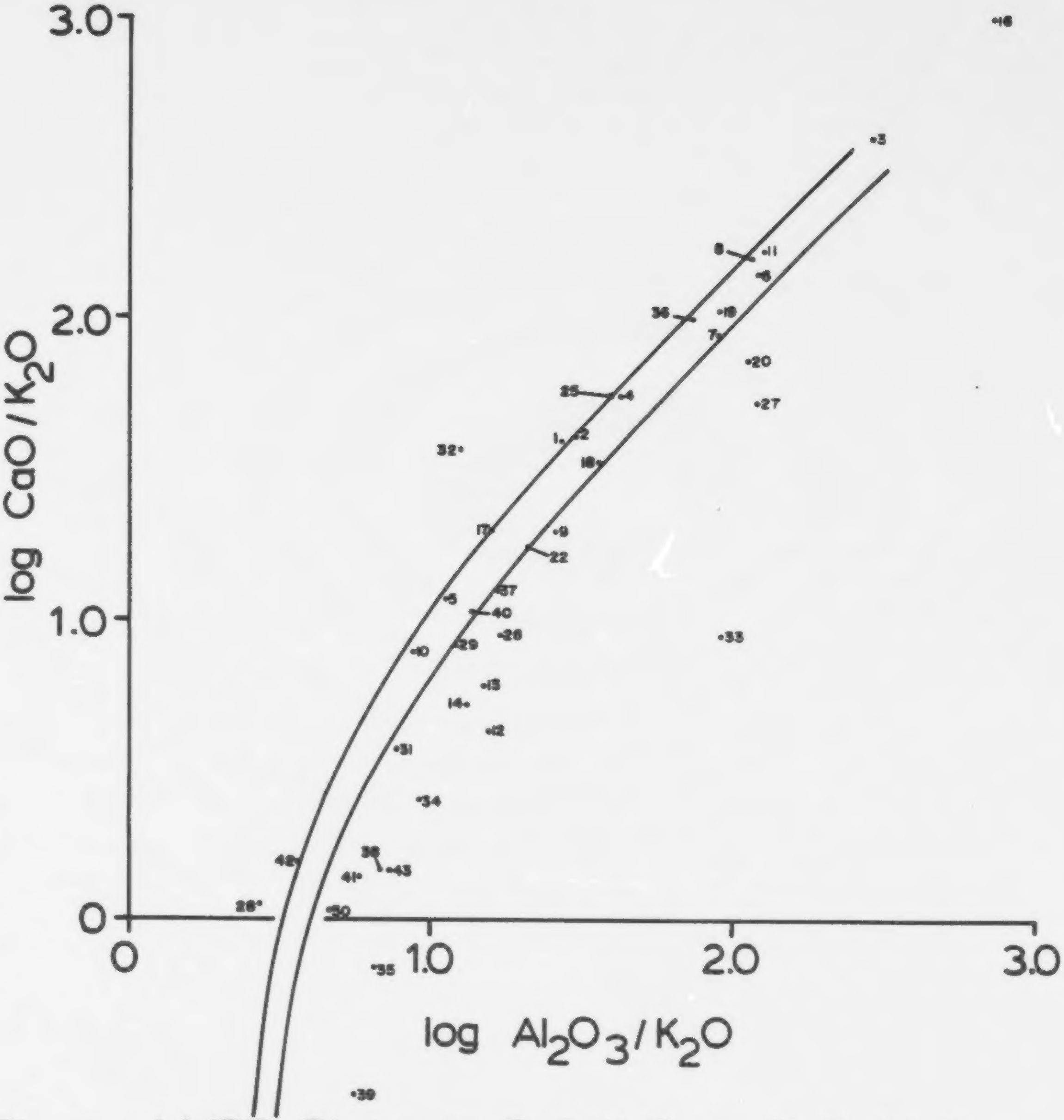


Fig. 5 – LMPR Diagram: CaO/K$_2$O vs. Al$_2$O$_3$/K$_2$O

FOR VOLCANIC ROCKS: SCHREIBER – TERRACE BAY AREA

Numbers on diagram correspond to sample numbers as listed in Table 2.

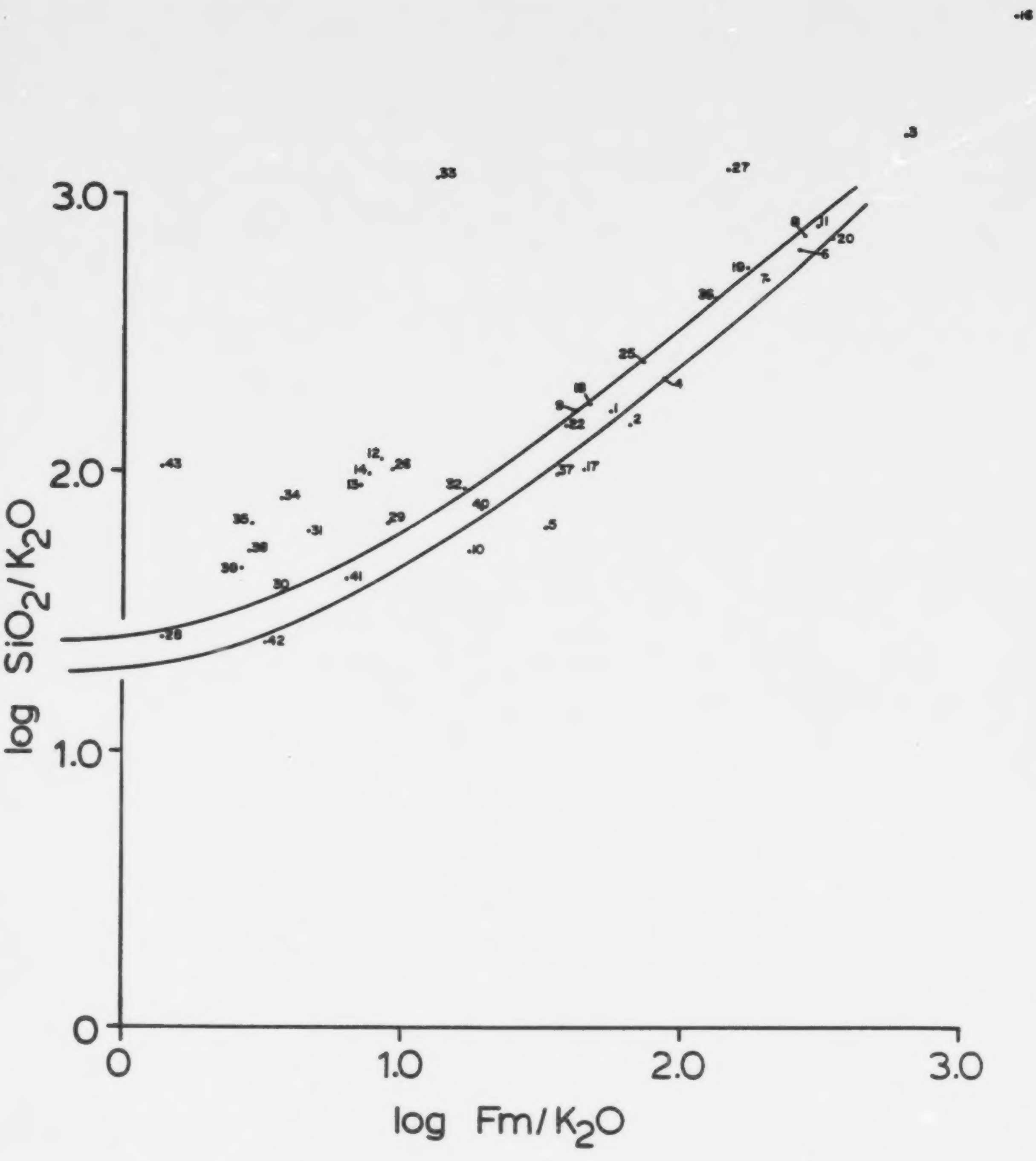


Fig. 6 - LMPR Diagram: SiO_2/K_2O vs. Fm/K_2O

FOR VOLCANIC ROCKS: SCHREIBER - TERRACE BAY AREA

Numbers on diagram correspond to sample numbers as listed in Table 2.

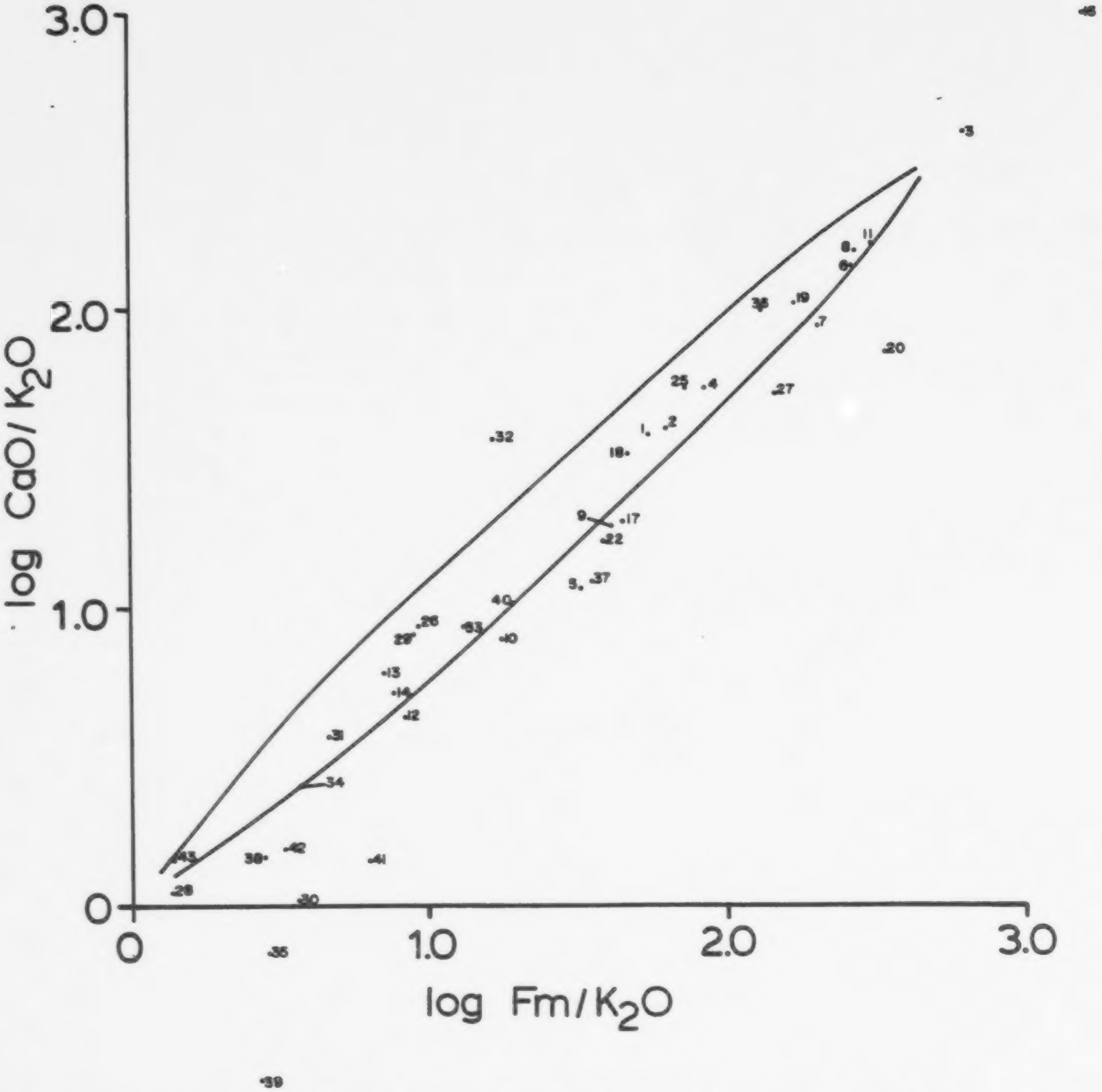


Fig. 7 – LMPR Diagram: CaO/K_2O vs Fm/K_2O

FOR VOLCANIC ROCKS: SCHREIBER – TERRACE BAY AREA

Numbers on diagram correspond to sample numbers as listed in Table 2.

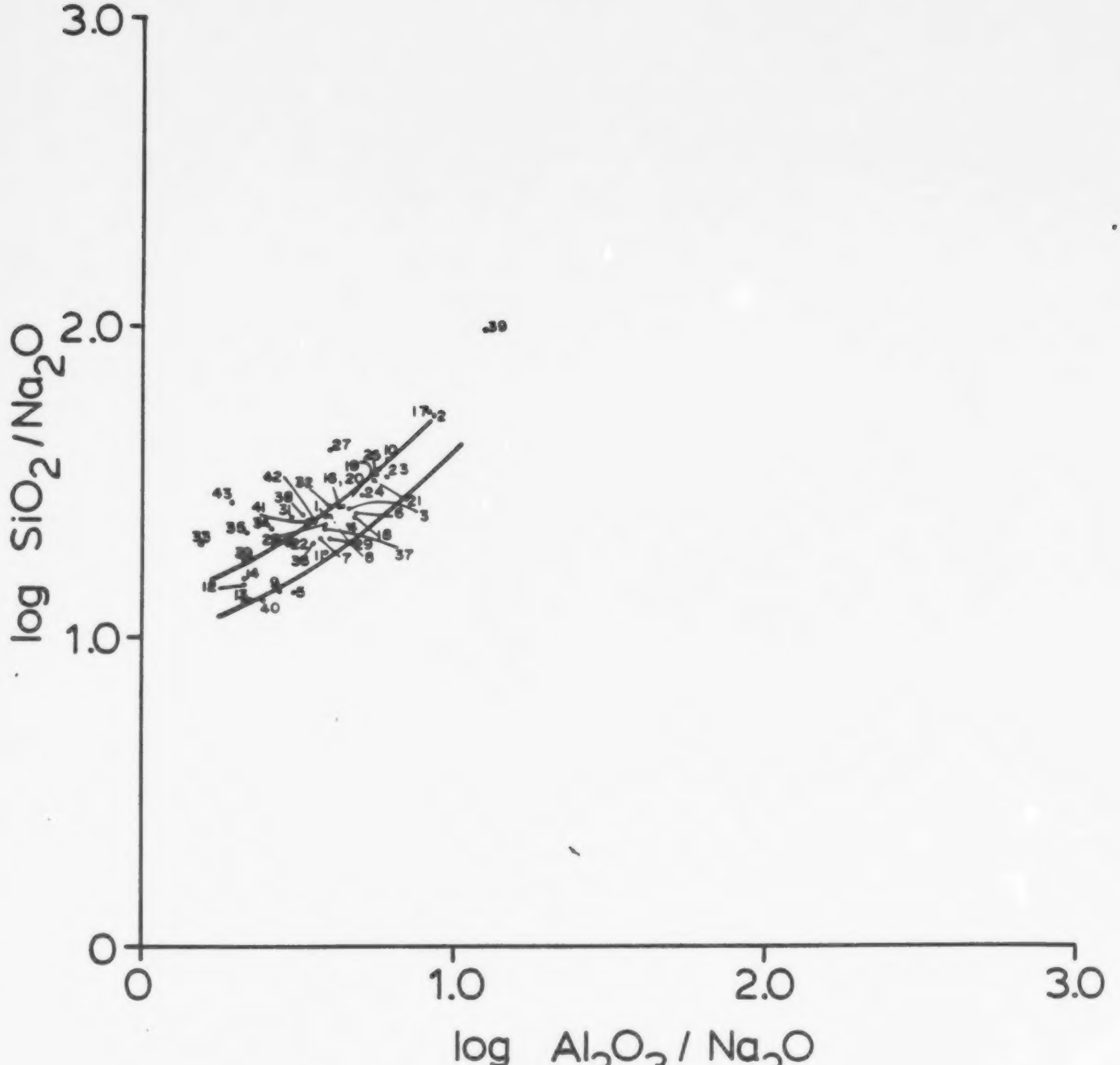


Fig.8 – LMPR Diagram: SiO_2/Na_2O vs. Al_2O_3/Na_2O

FOR VOLCANIC ROCKS: SCHREIBER – TERRACE BAY AREA
Numbers on diagram correspond to sample numbers
as listed in Table 2.

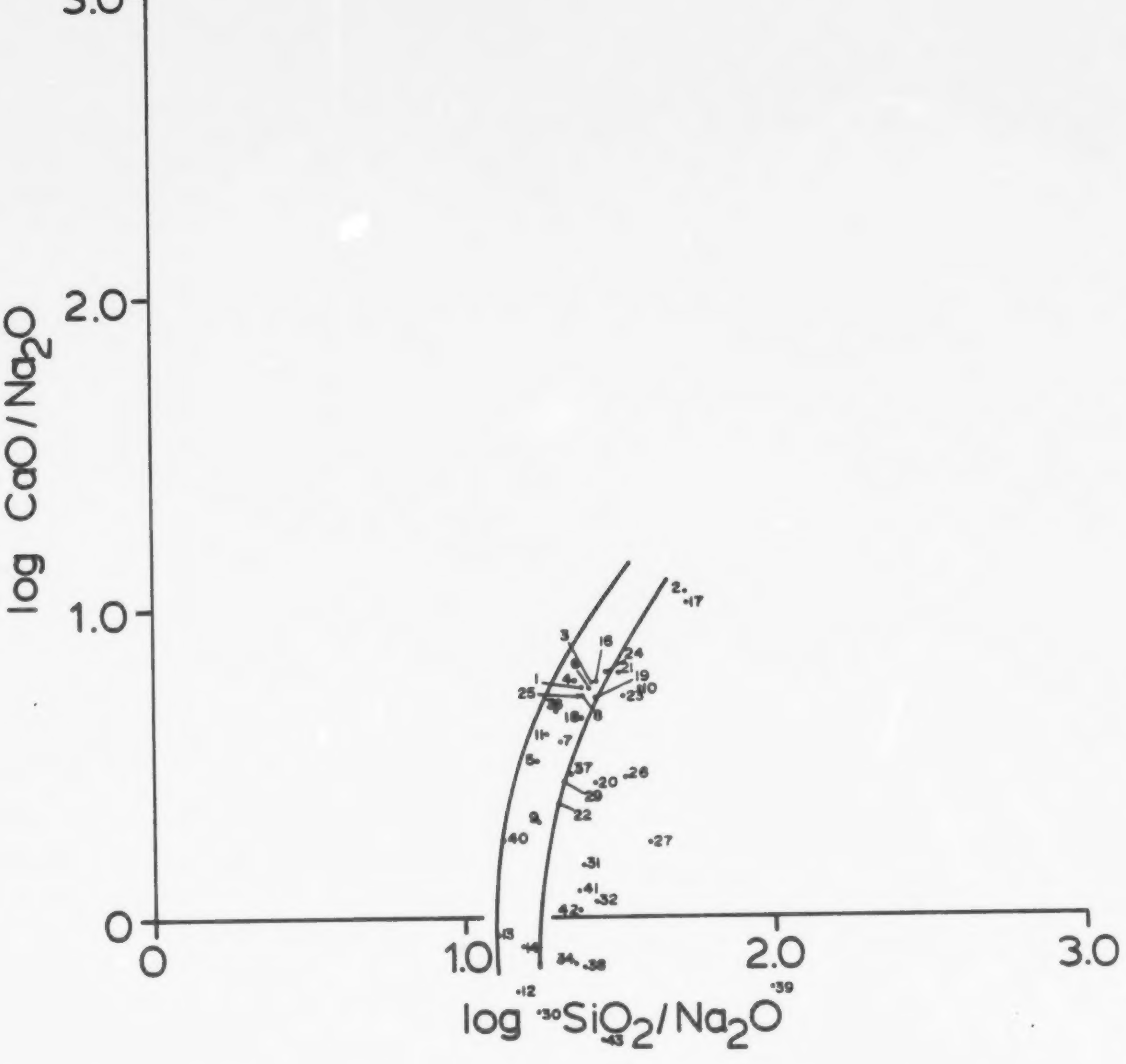


Fig. 9 - LMPR Diagram: CaO/Na$_2$O vs SiO$_2$/Na$_2$O

FOR VOLCANIC ROCKS: SCHREIBER-TERRACE BAY AREA
Numbers on diagram correspond to sample numbers
as listed in Table 2.

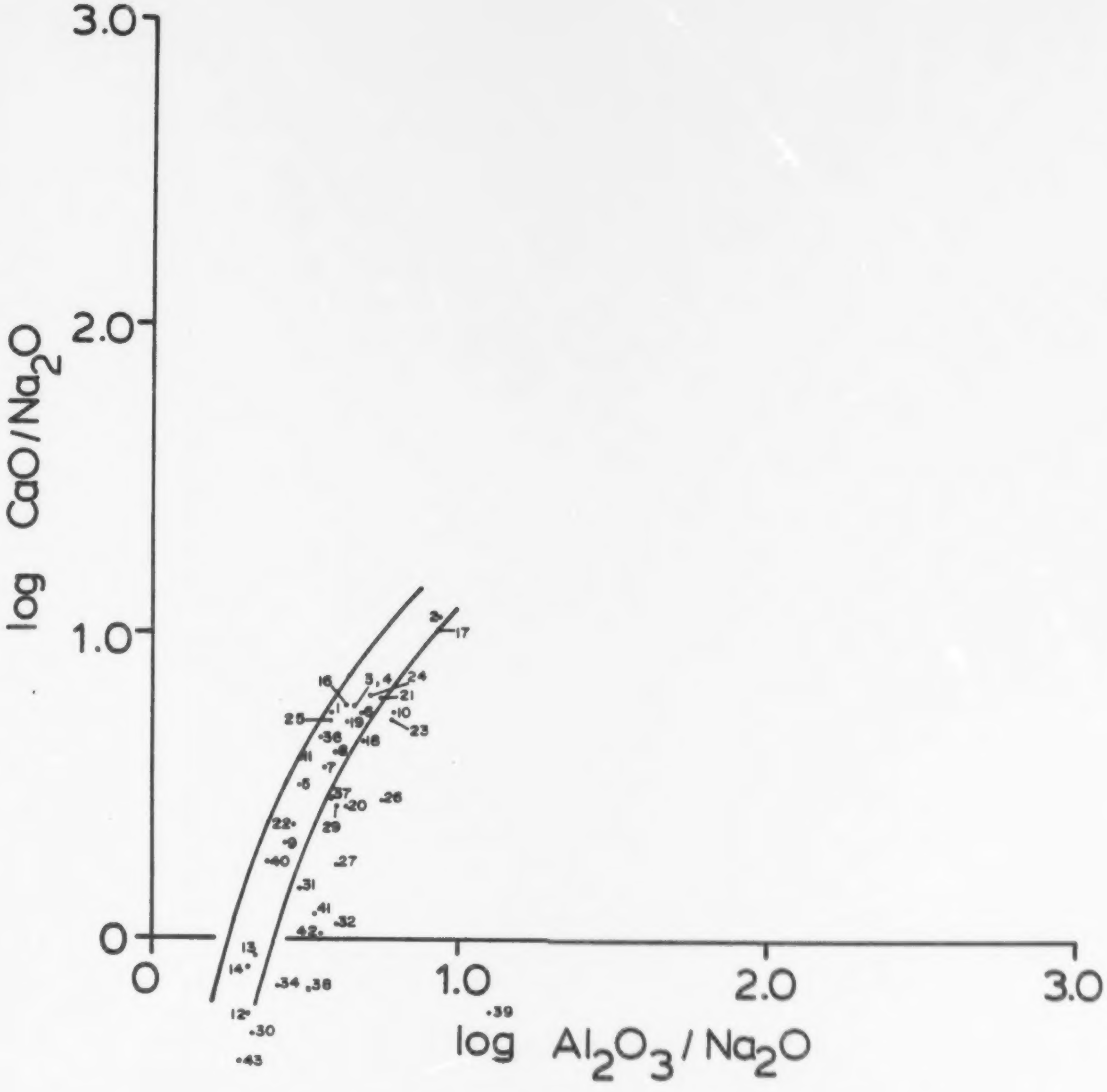


Fig.10- LMPR Diagram: CaO/Na_2O vs. Al_2O_3/Na_2O

FOR VOLCANIC ROCKS: SCHREIBER - TERRACE BAY AREA

Numbers on diagram correspond to sample numbers as listed in Table 2.

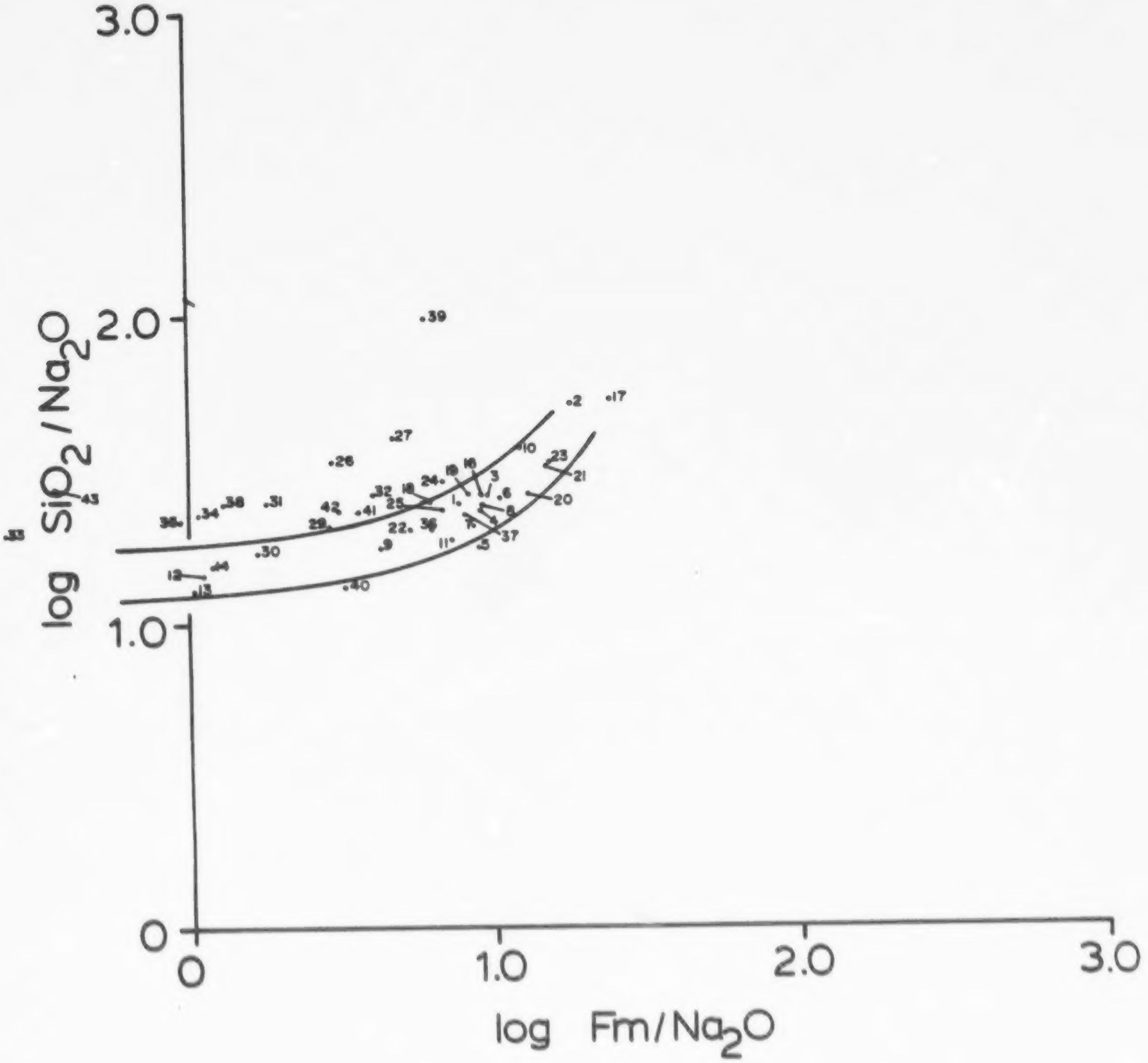


Fig. 11-LMPR Diagram: SiO_2/Na_2O vs. Fm/Na_2O

FOR VOLCANIC ROCKS: SCHREIBER - TERRACE BAY AREA
Numbers on diagram correspond to sample numbers
as listed in Table 2.

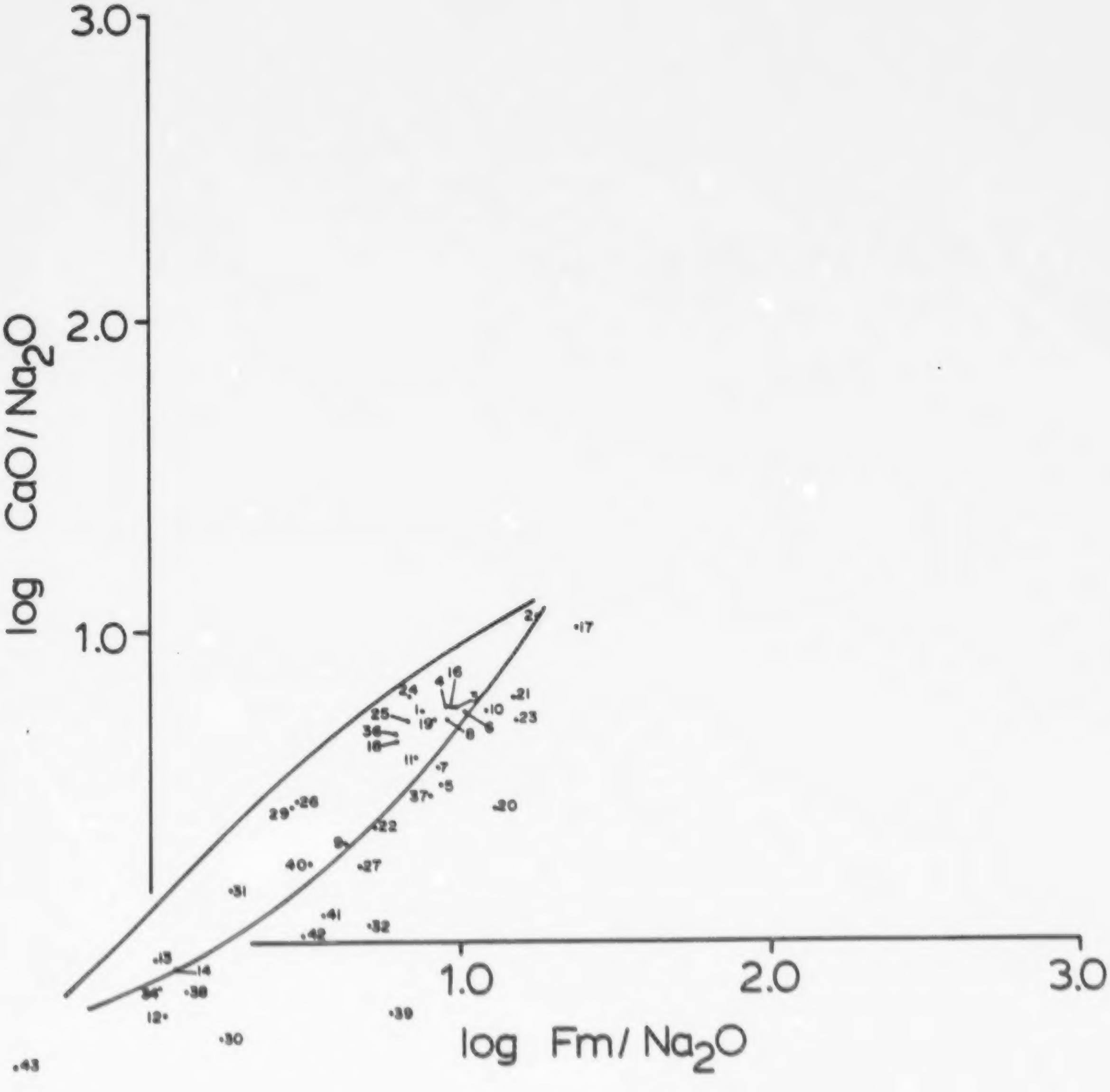


Fig. 12- LMPR Diagram: CaO/Na_2O vs. Fm/Na_2O

FOR VOLCANIC ROCKS: SCHREIBER - TERRACE BAY AREA
Numbers on diagram correspond to sample numbers
as listed in Table 2.

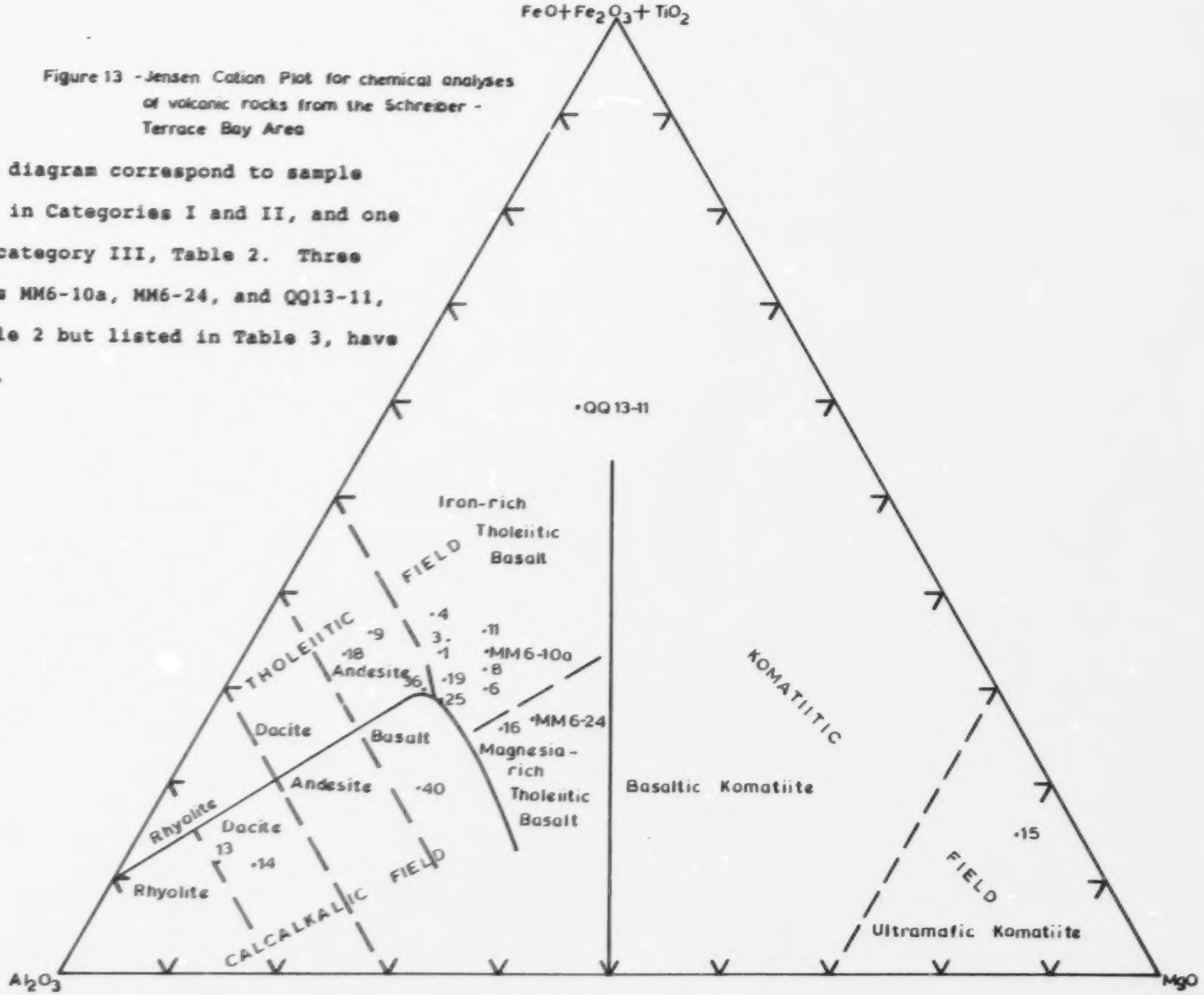
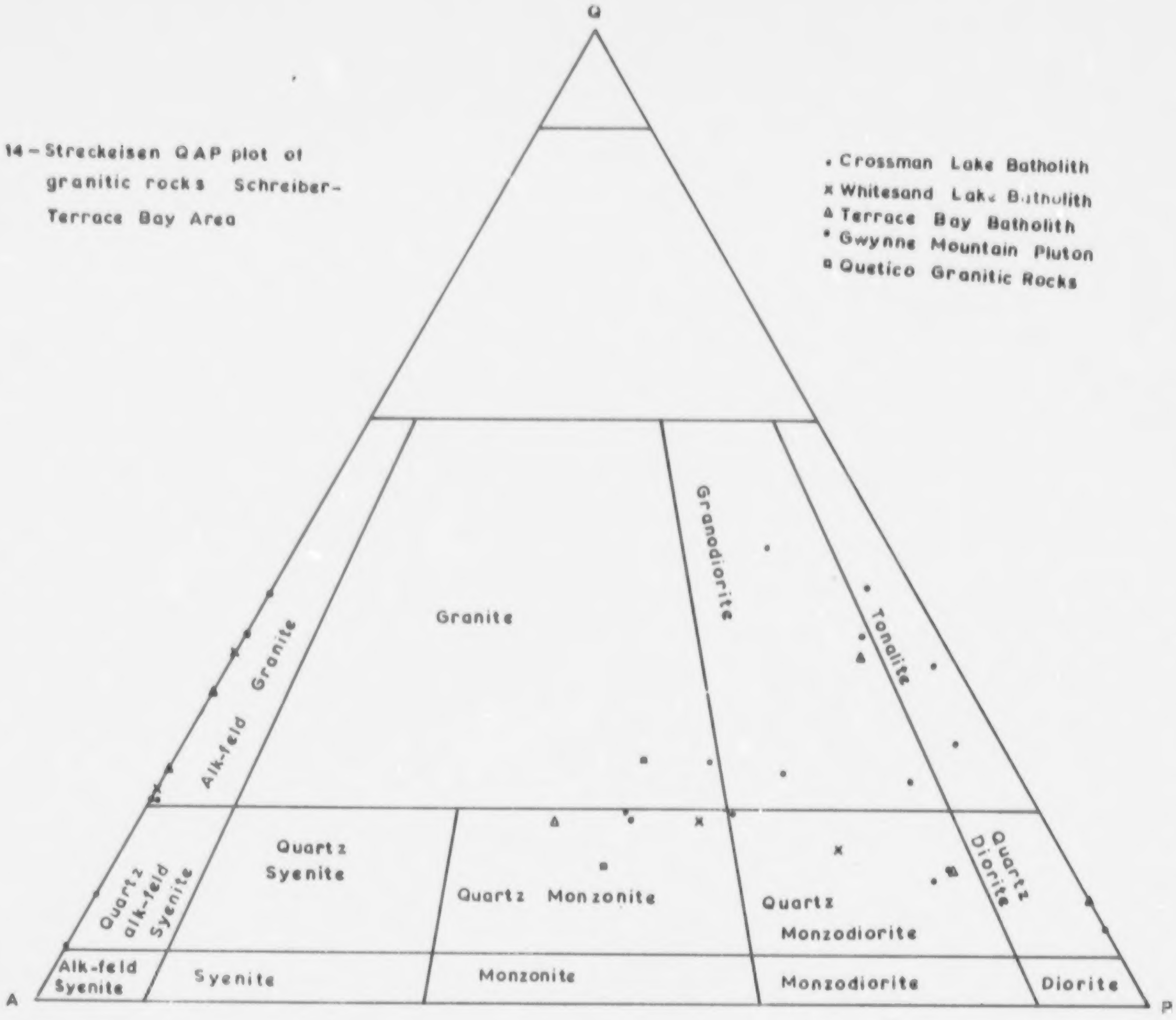


Figure 13 - Jensen Cation Plot for chemical analyses of volcanic rocks from the Schreiber - Terrace Bay Area

Numbers on diagram correspond to sample numbers as listed in Categories I and II, and one number (15) from category III, Table 2. Three additional samples MM6-10a, MM6-24, and QQ13-11, not listed in Table 2 but listed in Table 3, have also been plotted.

Figure 14 – Streckeisen QAP plot of granitic rocks Schreiber-Terrace Bay Area



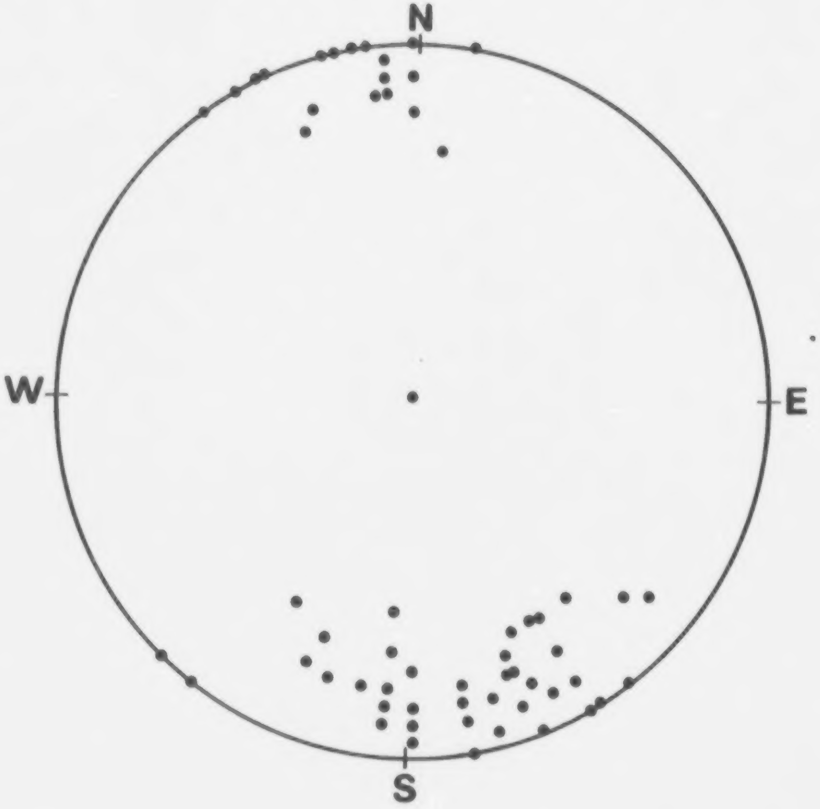


FIGURE 15: π-diagram of foliations in the region of the Hays Lake syncline, Schreiber-Terrace Bay Area

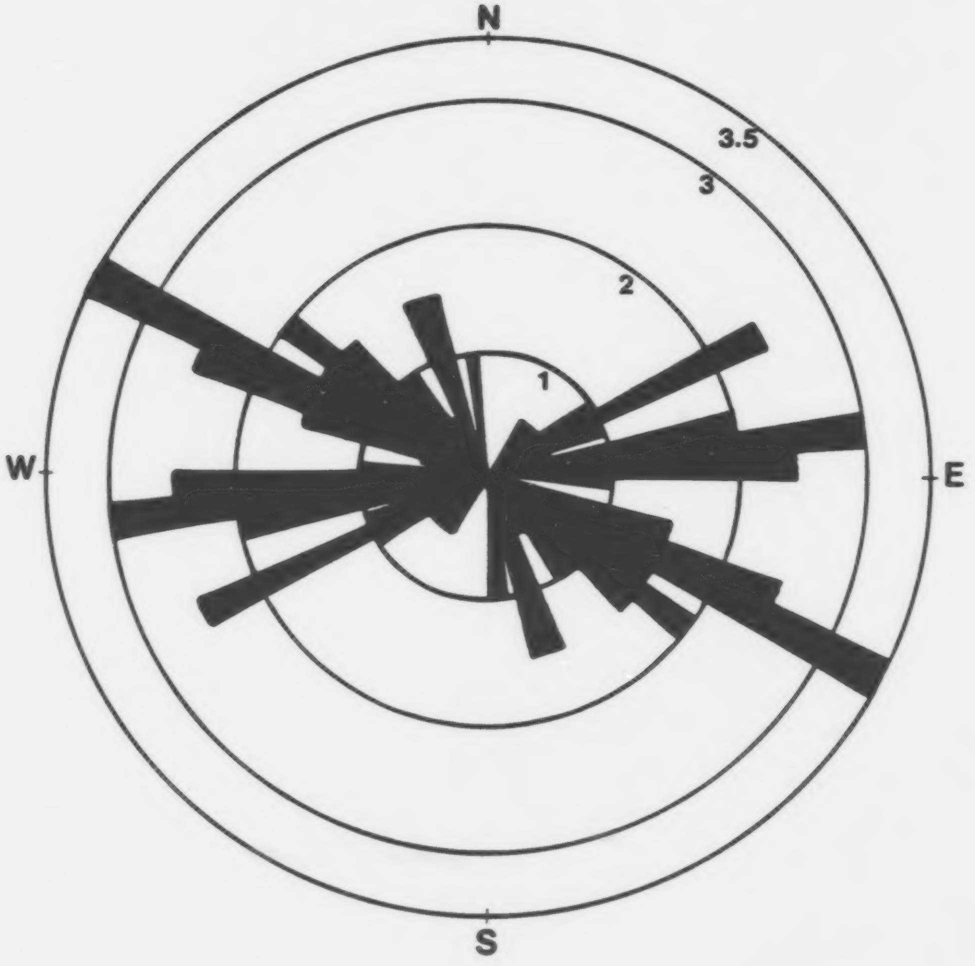


FIGURE 16: Rose diagram of pillow and bedding directions in the region of the Hay Lake syncline, Schreiber-Terrace Bay area

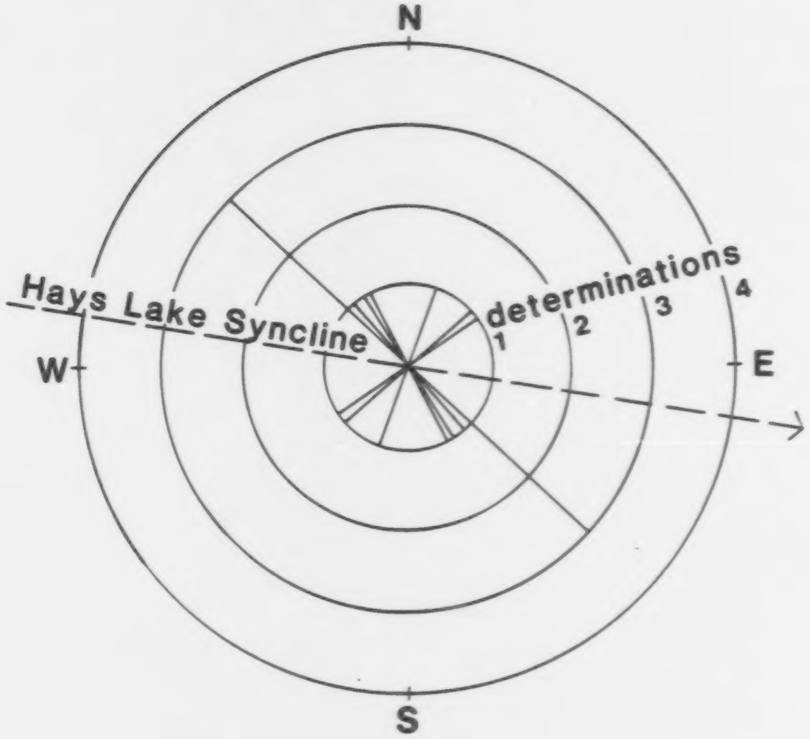


FIGURE 18: Rose diagram of auriferous shear zones in the folded supracrustal rocks in relation to the Hays Lake syncline, Schreiber-Terrace Bay area

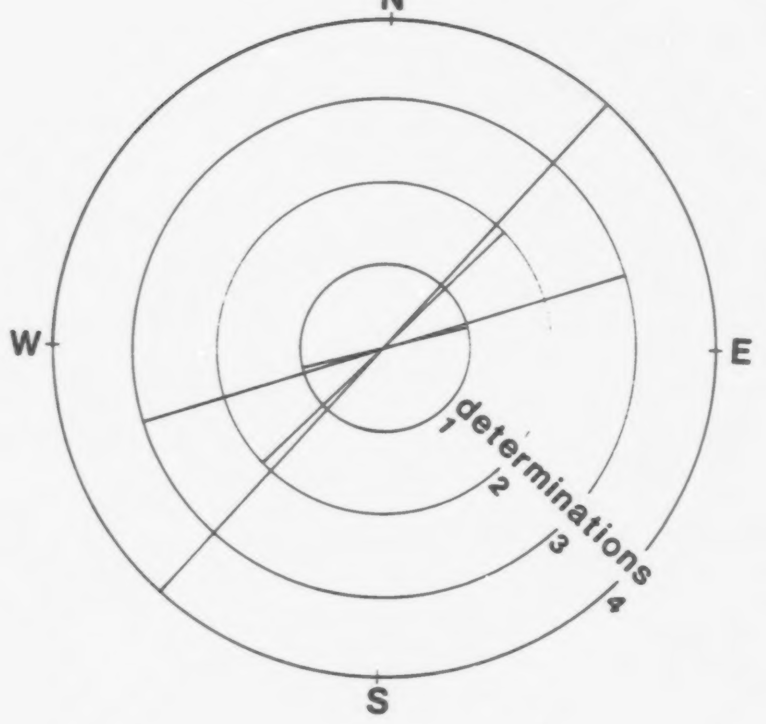


FIGURE 19: Rose diagram of auriferous shear zone in the contact region of the Terrace Bay Batholith, Schreiber-Terrace Bay area

Table 1: Table of Lithologic Units for the Schreiber-Terrace Bay Area

PHANEROZOIC

CENOZOIC

QUATERNARY

PLEISTOCENE AND RECENT

Sand, gravel, swamp and stream deposits

Unconformity

PRECAMBRIAN

PROTEROZOIC

MAFIC INTRUSIVE ROCKS (SILLS)

Diabase, feldspathic diabase

SEDIMENTARY ROCKS

ANIMIKIE GROUP

Gunflint Formation

Conglomerate, ironstone, shale, mudstone, chert, limestone

Unconformity

ARCHEAN TO PROTEROZOIC

DIATREME BRECCIA

Intrusive Contact

MAFIC INTRUSIVE ROCKS (DIKES)

Diabase, quartz diabase, feldspathic diabase, porphyritic diabase, olivine dibase, lamprophyre

Intrusive Contact

ARCHEAN

FELSIC INTRUSIVE ROCKS

Hornblende ± biotite granite to tonalite, biotite granite to tonalite: massive, porphyritic, porphyroblastic, gneissic and leucocratic; aplite; pegmatite; quartz porphyry, hornblende porphyry, biotite porphyry; granitoid- metasedimentary migmatite, granitoid- amphibole schist migmatite: garnetiferous and leucocratic.

Intrusive Contact

METAMORPHOSED MAFIC AND ULTRAMAFIC INTRUSIVE ROCKS

Gabbro, komatiitic serpentinite, hornblendite, diorite

Intrusive Contact

METAVOLCANICS AND METASEDIMENTS

METASEDIMENTS

Chemical metasediments

Ironstone, chert.

Clastic metasediments

Conglomerate, wacke, wacke with garnet, arenite with garnet, silicified argillite; graphitic shale; wacke-granite pegmatite migmatite, wacke-granite migmatite; wacke breccia; biotite-garnet-quartz-feldspar gneiss, biotite-quartz-feldspar schist.

METAVOLCANICS

Tholeiitic and calcalkalic metavolcanics

Aphanitic and porphyritic rhyolite flows; lapilli tuff and tuff-breccia.

Calcalkalic metavolcanics

Aphanitic to fine-grained, porphyritic, amygdaloidal, and variolitic andesite and dacite flows; lapilli tuff, tuff, vesicular tuff, crystal tuff, tuff-breccia; andesite-granite and dacite-granite migmatite.

Tholeiitic metavolcanics

Aphanitic to fine-grained, medium-grained, coarse-grained, amygdaloidal, variolitic, vesicular, porphyritic and pillowed basalt and andesite flows; carbonatized flows; tuff, autoclastic breccia; amphibolite, amphibolite-granite migmatite.

Table 2: LMPR analysis of volcanic rocks from the Schreiber-Terrace Bay Area
(See note below for explanation of this table)

Category Number		Number on Diagram	Ratioing Oxides	K20					Na20					Rock Name (specific name after Jensen 1976)	Position in Volcanic Sequence
			Oxide Pairs	SiO2-Al203	CaO-SiO2	CaO-Al203	SiO2-Fm	CaO-Fm	SiO2-Al203	CaO-SiO2	CaO-Al203	SiO2-Fm	CaO-Fm		
			Sample Nos.	Fig. 2	Fig. 3	Fig. 4	Fig. 5	Fig. 6	Fig. 7	Fig. 8	Fig. 9	Fig. 10	Fig. 11		
I		4	0018-12	X	X	X	X	X	X	X	X	X	X	Tholeiitic basalt, flow	Upper sequence: middle part
		36	QQ14-100	X	X	X	X	X	X	X	X	X	X	Tholeiitic andesite, pillowed flow	Upper sequence: lower part
		6	0026-1	X	X	X	X	X	X	X	X	X	X	Tholeiitic basalt, flow	Upper sequence: upper part
II	a	18	PP22-4	X	X	X	X	X	X	X		X	X	Tholeiitic andesite, flow	Upper sequence: upper part
		40	RR7-102	X	X	X	X	X	X	X	X		X	Calcalkalic basalt, flow	Lower sequence:
	b	1	RR10-100	X	X		X	X	X	X	X	X	X	Tholeiitic basalt, flow	Upper sequence: base
		3	QQ15-21						X	X	X	X	X	Tholeiitic basalt, flow	Upper sequence: lower part
		8	MM17-3		X	X	X	X	X	X	X	X	X	Tholeiitic basalt, flow	Upper sequence: lower part
		9	MM24-1				X		X	X	X	X	X	Tholeiitic andesite flow	Lower sequence: lower part
		11	NN13-2		X	X	X	X	X	X	X	X	X	Tholeiitic basalt, flow	Upper sequence: upper part
		13	SS4-39a	X				X	X	X	X	X	X	Calcalkalic dacite, tuff	Lower sequence: below QQ14-102
		14	QQ14-102					X	X	X	X	X	X	Calcalkalic dacite, tuff	Lower sequence: top
		16	QQ15-19						X	X	X	X	X	Tholeiitic basalt, flow	Upper sequence: lower part
		19	PP22-1a			X		X	X	X	X	X	X	Tholeiitic basalt, flow	Upper sequence: upper part
		25	PP16-19		X	X	X	X	X	X	X	X	X	Tholeiitic andesite, flow	Upper sequence: middle part

III	2	QQ16-9	X	X	X		X			X			Mafic volcanic, flow	Upper sequence: lower part
	5	0018-5	X	X	X		X		X	X			Mafic volcanic, flow	Upper sequence:
	7	NN24-7	X		X	X		X	X	X	X		Mafic volcanic, flow	Upper sequence:
	10	QQ14-105	X	X	X			X			X		Mafic tuff, pyroclastic flow	Lower sequence: top
	12	SS4-25						X		X			Intermediate volcanic tuff	Lower sequence: lower part
	15	0018-1											Ultramafite	Upper sequence:
	17	PP20-109		X	X					X			Mafic volcanic, flow	Upper sequence:
	20	0018-11				X		X			X		Mafic volcanic, flow	Upper sequence:
	21	0022-1						X		X	X		Mafic volcanic, flow	Upper sequence:
	22	0018-4			X	X		X	X	X	X		Mafic volcanic, flow	Upper sequence:
	23	NN22-12							X		X	X	Mafic volcanic, flow	Upper sequence:
	24	QQ15-6						X	X	X		X	Intermediate volcanic, flow	Upper sequence:
	26	0022-4	X				X	X				X	Mafic volcanic, flow	Upper sequence:
	27	0027-4											Intermediate volcanic, flow	Upper sequence:
	28	NN16-12		X		X							Intermediate volcanic, flow	Upper sequence:
	29	NN23-1	X	X	X		X	X	X		X	X	Mafic volcanic, flow	Upper sequence:
	30	NN24-3				X		X		X			Intermediate volcanic, flow	Upper sequence:
	31	MM21-4					X					X	Intermediate volcanic, flow	Upper sequence:
	32	0027-3						X				X	Felsic volcanic, flow	Upper sequence:
	33	MM17-5					X						Felsic volcanic, flow	Upper sequence:
	34	MM18-3					X						Felsic volcanic, flow	Upper sequence:
	35	MM18-4											Intermediate volcanic, tuff	Upper sequence:
	37	QQ14-104	X		X			X			X		Mafic tuff	Lower sequence: top
	38	SS4-28											Intermediate volcanic, tuff	Lower sequence: lower part
	39	SS4-43											Intermediate volcanic, flow	Lower sequence: lower part
	41	QQ14-101	X			X		X					Intermediate volcanic, flow	Lower sequence: upper part
	42	QQ10-6	X	X	X			X					Intermediate volcanic, flow	Lower sequence: upper part
	43	NN14-8					X						Felsic volcanic, flow	Stratigraphic position in indeterminate

Notes:

1. X indicates that a given ratio value falls within the designated curves.
2. Only the samples listed in Categories I and II and number 15 (0018-1) from this table are plotted on Figure 13.

Table 3: Chemical analysis and specific gravity of tholeiitic basalts and andesites from the Schreiber-Terrace Bay Area
Major components (weight percent):

Column No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Specimen No.	0018-12	0026-1	RR10-100	MM17-3	QQ14-100	QQ15-21	MM24-1	NN13-2	QQ15-19	PP16-19	PP22-4	PP22-1a	MM6-10a	MM6-24	QQ13-11	QQ14-104
SIO2	46.10	49.00	50.60	50.40	51.20	49.30	54.90	50.00	53.00	48.00	50.70	53.80	54.80	51.40	39.90	52.50
Al2O3	15.60	15.80	14.10	14.40	15.40	14.70	14.80	14.20	14.60	13.10	17.30	15.20	13.30	13.90	9.48	15.40
FE2O3	4.40	3.60	1.80	2.10	2.89	2.20	3.98	3.10	2.05	0.94	3.38	2.80	3.40	2.69	6.70	2.10
FEO	10.90	9.23	10.90	11.00	8.74	12.20	8.75	11.60	8.42	8.34	8.75	9.23	10.10	8.65	26.60	9.73
MGO	3.80	6.43	3.93	5.78	4.28	4.48	2.27	5.38	6.71	4.06	2.24	4.77	5.20	7.49	5.43	6.31
CAO	10.80	9.89	10.90	10.30	10.90	10.40	5.97	9.93	10.90	9.62	8.70	9.75	8.16	10.10	5.95	7.08
NA2O	2.07	2.24	2.19	2.18	2.65	1.96	3.24	2.79	2.09	2.09	2.20	2.10	2.56	2.30	0.97	2.44
K2O	0.34	0.11	0.48	0.11	0.20	0.05	0.53	0.10	0.02	0.30	0.45	0.16	0.65	0.64	0.08	0.87
TIO2	2.71	1.63	1.26	1.51	0.93	1.24	1.53	2.03	0.91	1.04	2.54	1.40	1.23	0.84	0.72	1.29
P2O5	0.35	0.18	0.04	0.06	0.09	0.05	0.71	0.23	0.02	0.04	0.31	0.05	0.05	0.00	0.01	0.04
S	0.21	0.07	0.09	0.10	0.03	0.05	0.01	0.02	0.03	0.03	0.12	0.08	0.08	0.03	0.36	0.43
MNO	0.24	0.19	0.22	0.21	0.29	0.20	0.21	0.17	0.18	0.18	0.34	0.20	0.20	0.19	1.41	0.29
CO2	0.65	0.53	1.68	0.21	1.57	1.73	0.33	0.04	0.33	7.13	0.45	0.12	0.19	0.22	0.31	0.69
H2O+	0.98	1.04	1.62	0.73	1.02	1.11	1.60	0.66	0.86	3.58	1.58	0.89	0.64	0.50	2.01	1.10
H2O-	0.12	0.18	0.07	0.01	0.23	0.06	0.12	0.23	0.08	0.17	0.06	0.09	0.19	0.24	0.24	0.26
Total	99.27	100.12	99.88	99.10	100.42	99.73	98.95	100.48	100.20	98.62	99.12	100.64	100.75	99.19	100.17	100.53
SPEC. GR.	3.07	3.00	2.93	3.04	2.96	2.97	2.91	3.06	3.01	2.77	2.91	2.99	3.00	3.00	3.32	2.96

Trace Elements (ppm)X;

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Ba	80	110	110	60	110	80	190	10	100	90	90	100	-	-	-	-
Co	58	42	42	48	43	50	17	46	40	36	53	36	-	-	-	-
Cr	180	155	39	81	230	156	-5	189	130	131	193	85	-	-	-	-
Cu	88	56	131	87	114	109	9	59	96	95	79	100	-	-	-	-
Li	7	5	16	6	4	8	8	8	-3	12	12	3	-	-	-	-
Mo	-	-3	-3	-	-	-3	-3	-	-3	-3	-	-3	-10	-10	-10	-10
Ni	171	88	43	72	87	98	-5	122	90	42	141	30	-	-	-	-
Pb	-10	22	-10	-10	24	-10	-10	113	-10	-10	-10	-10	-	-	-	-
Zn	160	138	110	230	92	125	155	136	85	104	139	84	-	-	-	-
Sr	-	-	-	-	120	-	-	-	-	-	-	--	131	90	25	180
V	-	-	-	-	-	-	-	-	-	-	-	-	285	210	135	290
Y	-	-	-	-	20	-	-	-	-	-	-	-	40	15	18	30
Zr	-	-	-	-	40	-	-	-	-	--	-	-	90	45	70	135
Rb	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-

Name and location of specimen:

1 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop on southwestern shore of Big Bruin Lake, central part of map area.
2 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop 0.80 km southeast of Baws Lake, east-central part of the map area.
3 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop 2.5 km west of the southwestern corner of Hays Lake in the south-central part of the map area.
4 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop 0.5 km north-northeast of Ansell Lake, in the central part of the map area.
5 Tholeiitic andesite; greenish-black, fine-grained pillowed flow, upper sequence: from outcrop on Highway 17, 1.75 km southeast of Schreiber, in the south-central part of the map area.
6 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop at microwave tower, 0.6 km northeast of Schreiber in the south-central part of the map area.
7 Tholeiitic andesite; black, aphanitic to fine-grained flow, upper sequence: from outcrop 0.5 km west of the southern end of Sand Lake (local name) in the east-central part of the map area.
8 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop 1 km west of Victoria Lake in the central part of the map area.
9 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop 1.2 km northwest of Lamont Lake in the south-central part of the map area.
10 Tholeiitic andesite; grey, carbonatized, medium-grained flow, upper sequence: from outcrop 200 m east of the southern end of Hollinger Lake, south-central part of the map area.
11 Tholeiitic andesite; black, aphanitic to fine-grained flow, upper sequence: from outcrop 400 m west of Mile 2.5 on Kimberly-Clark of Canada Road, southeastern part of the map area.
12 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop 100 m west of Mile 2.5 on Kimberly-Clark of Canada Road southeastern part of the map area.
13 Amphibolite (tholeiitic basalt); black, upper sequence: from outcrop 3 km northwest of Sox Lake, in the northwestern part of the map area.
14 Amphibolite (tholeiitic basalt); black, upper sequence: from outcrop 2.5 km north-northwest of Sox Lake, in the northwestern part of the map area.
15 Tholeiitic basalt; black-green, lower sequence: from outcrop 2 km southwest of Schreiber, south-central margin of the map area.
16 Tuff, mafic (tholeiitic basalt); greenish black: from outcrop on Highway 17, 0.5 km southeast of Schreiber in the south-central part of the map area.

Note:
X Negative value denotes detection limit.
Dash alone (-) means not analysed for.

Table 4: Molecular norm, normative colour index and normative plagioclase composition of tholeiitic basalts and andesites from the Schreiber-Terrace Bay Area

Column No. Specimen No.	1 0018-12	2 0026-1	3 RR10-100	4 MM17-3	5 QQ14-100	6 QQ15-21	7 MM24-1	8 NN13-2	9 QQ15-19	10 PP16-19	11 PP22-4	12 PP22-1a	13 MM6-10a	14 MM6-24	15 QQ13-11	16 QQ14-104
Quartz	3.4	3.6	5.0	3.9	4.3	4.6	13.9	2.2	6.5	7.5	11.7	10.5	8.5	1.8	0.0	5.4
Corundum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Orthoclase	2.1	0.7	3.0	0.7	1.2	0.3	3.3	0.6	0.1	2.1	2.8	1.0	3.9	3.9	0.5	5.3
Albite	19.8	18.5	20.9	20.4	24.9	18.7	31.0	25.8	19.2	21.8	21.1	19.4	23.6	21.2	9.7	22.5
Anorthite	34.3	35.1	29.0	30.4	30.9	33.2	25.9	26.7	31.1	29.6	38.4	32.5	23.5	26.4	23.6	29.2
Diopside	8.1	7.5	9.9	9.7	10.1	7.5	0.2	9.5	12.3	10.3	1.9	7.5	7.4	12.9	1.8	3.1
Hedenbergite	8.1	4.3	12.8	8.3	9.9	9.6	0.4	8.5	7.0	10.1	2.5	6.0	6.8	7.1	5.5	2.1
Enstatite	7.1	15.2	6.6	11.8	7.3	9.4	6.6	10.5	12.8	7.9	5.6	9.8	11.0	14.8	5.5	16.3
Ferrosilite	7.1	8.7	8.6	10.1	7.1	12.1	11.5	9.3	7.3	7.8	7.3	7.9	10.1	8.1	17.2	10.8
Forsterite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0
Fayalite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.8	0.0
Hematite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Magnetite	4.7	3.4	2.0	2.3	2.7	2.4	3.4	3.3	2.2	1.1	3.8	3.0	2.9	2.5	2.6	2.3
Ilmenite	4.0	2.4	1.9	2.2	1.4	1.8	2.3	2.9	1.3	1.7	3.8	2.0	1.8	1.2	1.1	1.8
Apatite	0.9	0.4	0.1	0.1	0.2	0.1	1.8	0.5	0.0	0.1	0.8	0.1	0.1	0.0	0.0	0.1
Pyrrhotite	0.6	0.2	0.2	0.3	0.1	0.1	0.0	0.1	0.1	0.1	0.3	0.2	0.2	0.1	1.0	1.1
Total	100.2	100.0	100.0	100.2	100.9	99.8	100.3	99.9	99.9	100.1	100.0	99.9	99.8	100.0	100.0	100.0
Molecular Color Index Normative	39	41	42	44	38	43	24	44	43	39	25	36	40	47	65	36
Plagioclase Name	Labra-dorite	Labra-dorite	Labra-dorite	Labra-dorite	Labra-dorite	Labra-dorite	Ande-sine	Labra-dorite	Labra-dorite	Labra-dorite	Labra-dorite	Labra-dorite	Andesine -Labra-dorite	Labra-dorite	Bytownite	Labra-dorite
% An	64	62	58	60	55	64	45	51	62	58	65	63	50	55	71	57

Name and location of specimen:

1 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop on southwestern shore of Big Bruin Lake, central part of map area.

2 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop 0.80 km southeast of Bews Lake, east-central part of the map area.

3 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop 2.5 km west of the southwestern corner of Hays Lake in the south-central part of the map area.

4 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence from outcrop 0.5 km north-northeast of Ansell Lake, in the central part of the map area.

5 Tholeiitic andesite; greenish-black, fine-grained pillowed flow, upper sequence: from outcrop on Highway 17, 1.75 km southeast of Schreiber, in the south-central part of the map area.

6 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop at microwave tower, 0.6 km northeast of Schreiber in the south-central part of the map area.

7 Tholeiitic andesite; black, aphanitic to fine-grained flow, upper sequence: from outcrop 0.5 km west of the southern end of Sand Lake (local name) in the east-central part of the map area.

8 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop 1 km west of Victoria Lake in the central part of the map area.

9 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop 1.2 km northwest of Lamont Lake in the south-central part of the map area.

10 Tholeiitic andesite; grey, carbonatized, medium-grained flow, upper sequence: from outcrop 200 m east of the southern end of Hollinger Lake, south-central part of the map area.

11 Tholeiitic andesite; black, aphanitic to fine-grained flow, upper sequence: from outcrop 400 m west of Mile 2.5 on Kimberly-Clark of Canada Road, southeastern part of the map area.

12 Tholeiitic basalt; black, aphanitic to fine-grained flow, upper sequence: from outcrop 100 m west of Mile 2.5 on Kimberly-Clark of Canada Road southeastern part of the map area.

13 Amphibolite (tholeiitic basalt); black, upper sequence: from outcrop 3 km northwest of Sox Lake, in the northwestern part of the map area.

14 Amphibolite (tholeiitic basalt); black, upper sequence: from outcrop 2.5 km north-northwest of Sox Lake, in the northwestern part of the map area.

15 Tholeiitic basalt; black-green, lower sequence: from outcrop 2 km southwest of Schreiber, south-central margin of the map area.

16 Tuff, mafic (tholeiitic basalt); greenish black: from outcrop on Highway 17, 0.5 km southeast of Schreiber in the south-central part of the map area.

Table 5: Chemical analysis and specific gravity of calcalkalic rocks from the Schreiber-Terrace Bay Area
Major components (weight percent):

Column No.	1	2	3
Specimen No.	SS4-39a	QQ14-102	RR7-102
SIO2	62.40	67.80	54.60
AI2O3	17.80	15.40	16.80
FE2O3	1.68	0.25	1.48
FEO	1.66	2.50	5.66
MGO	1.54	1.96	5.28
CAO	3.86	3.28	6.94
NA2O	4.94	4.48	4.29
K2O	1.09	1.08	1.15
TIO2	0.61	0.60	0.89
P2O5	0.09	0.15	0.28
S	1.64	0.60	0.01
MNO	0.03	0.09	0.13
CO2	2.53	0.87	0.57
H2O+	1.98	1.16	1.97
H2O-	0.39	0.25	0.36
Total	102.24+	100.47	100.41
SPEC. GR.	2.72	2.70	2.84

Trace elements (ppm)X:

Ba	230	160	480
Co	22	22	28
Cr	256	296	133
Cu	45	32	14
Li	24	18	28
Ni	163	103	75
Pb	10	-10	50
Rb	40	50	-
Sr	340	460	-
Y	10	10	-
Zn	41	48	106
Zr	140	110	-

Name and location of specimen:

1 Calcalkalic dacite; grey aphanitic flow or tuff, lower sequence: from outcrop on northwestern shore of Worthington Bay, at the south-central boundary of the map area.
2 Calcalkalic dacite; grey aphanitic flow or tuff, lower sequence: from outcrop on Highway 17, 1 km southeast of Schreiber in the south-central part of the map area.
3 Calcalkalic basalt*; dark green porphyritic flow, lower sequence: from outcrop on shore of Lake Superior, Collingwood Bay.

Notes:

* Calcalkalic andesite (Irvine and Bargar 1971, Miyashiro 1974).
+ High summation due to high sulphur content (O.M.N.R. 1981, p. 16-17).
X Negative value denotes detection limit.
Dash alone (-) means not analysed for.

Table 6: Molecular norm, normative colour index and normative plagioclase composition of calcalkalic metavolcanic rocks from the Schreiber-Terrace Bay Area

Column No.	1	2	3
Specimen No.	SS4-39a	QQ14-102	RR7-102
Quartz	17.9	25.9	1.6
Corundum	1.9	1.4	0.0
Orthoclase	6.5	6.5	6.9
Albite	44.7	40.8	39.1
Anorthite	18.7	15.5	23.5
Diopside	0.0	0.0	5.2
Hedenbergite	0.0	0.0	2.4
Enstatite	4.3	5.5	12.2
Ferrosilite	0.0	0.9	5.6
Forsterite	0.0	0.0	0.0
Fayalite	0.0	0.0	0.0
Hematite	1.2	0.0	0.0
Magnetite	0.0	0.3	1.6
Ilmenite	0.0	0.8	1.3
Rutile	0.4	0.0	0.0
Apatite	0.2	0.3	0.6
Pyrrhotite	4.3	2.1	0.0
Total	100.1	100.0	100.0
Molecular Colour Index	2	8	28
Normative Plagioclase Name	Oligoclase-andesine	Oligoclase	Andesine
%An	30	28	38

Name and location of specimen:

1 Calcalkalic dacite; grey aphanitic flow or tuff, lower sequence: from outcrop on northwestern shore of Worthington Bay, at the south-central boundary of the map area.

2 Calcalkalic dacite; grey aphanitic flow or tuff, lower sequence: from outcrop on Highway 17, 1 km southeast of Schreiber in the south-central part of the map area.

3 Calcalkalic basalt*; dark green porphyritic flow, lower sequence: from outcrop on shore of Lake Superior, Collingwood Bay.

Note:

* Calcalkalic andesite (Irvine and Bargar 1971, Miyashiro 1974).

Table 7: Chemical analysis and specific gravity of tholeiitic and calcalkalic felsic volcanic rocks, Schreiber-Terrace Bay Area
Major components (weight percent):

Column No.	1	2	3	4
Specimen No.	MM17-5	MM18-3	MM18-4	NN14-8
SI02	81.90	72.50	75.80	82.10
AI203	11.00	14.10	12.90	9.96
FE203	0.0	1.07	1.20	0.36
FEO	0.89	1.86	2.03	0.50
MGO	0.13	0.68	0.49	0.28
CAO	0.59	2.13	0.76	1.10
NA20	4.37	3.31	3.63	3.08
K20	0.11	1.43	1.85	1.27
TI02	0.24	0.56	0.36	0.19
P205	0.0	0.03	0.0	0.03
S	0.5	0.21	0.01	0.32
MNO	0.01	0.04	0.06	0.02
CO2	0.2	0.43	0.45	0.77
H20+	0.32	0.53	0.91	0.38
H20-	0.10	0.12	0.08	0.25
Total	99.91	99.00	100.53	100.61
SPEC. GR.	2.62	2.71	2.68	2.66

Trace elements (ppm)X:

Ba	160	350	620	180
Co	-5	7	-5	-5
Cr	-5	-5	-5	-5
Cu	178	52	6	68
LI	5	16	14	7
Mo	-	-	-	-
NI	-5	-5	-5	-5
Pb	-10	16	-10	18
Zn	25	140	46	34

Name and location of specimen:

1 Rhyolite, calcalkalic; grey quartz-feldspar phyric flow, upper sequence: from outcrop 1.4 km northeast of Ansell Lake, central part of map area.
2 Dacite calcalkalic; grey porphyritic flow, upper sequence: from outcrop 2.5 km northeast of Ansell Lake, central part of map area.
3 Rhyolite calcalkalic; grey porphyritic flow, upper sequence: from outcrop 0.7 km west of Syenite Lake, central part of map area.
4 Rhyolite calcalkalic; grey quartz-feldspar phyric flow, upper sequence: from outcrop 0.5 km north-northwest of Victoria Lake, cental part of map area.

Note:

X Negative value denotes detection limit.
Dash alone (-) means not analysed for.
Classification according to Irvine and Baragar (1971).

Table 8: Molecular norm, normative colour index and normative plagioclase composition of tholeiitic-calcalkalic felsic volcanic rocks, Schreiber-Terrace Bay Area

Column No.	1	2	3	4
Specimen No.	MM17-5	MM18-3	MM18-4	NN14-8
Quartz	51.3	40.1	42.2	54.2
Corundum	2.9	3.8	4.0	1.8
Acmite	0.0	0.0	0.0	0.0
Orthoclase	0.7	8.8	11.3	7.8
Albite	40.2	30.9	33.6	28.6
Anorthite	3.0	10.8	3.9	5.4
Leucite	0.0	0.0	0.0	0.0
Nepheline	0.0	0.0	0.0	0.0
Kaliophilite	0.0	0.0	0.0	0.0
Diopside	0.0	0.0	0.0	0.0
Hedenbergite	0.0	0.0	0.0	0.0
Enstatite	0.4	2.0	1.4	0.8
Ferrosilite	1.0	1.1	1.9	0.0
Forsterite	0.0	0.0	0.0	0.0
Fayalite	0.0	0.0	0.0	0.0
Hematite	0.0	0.0	0.0	0.3
Magnetite	0.0	1.2	1.3	0.0
Ilmenite	0.3	0.8	0.5	0.3
Apatite	0.0	0.1	0.0	0.1
Pyrrhotite	0.1	0.6	0.0	1.1
Total	99.9	100.2	100.1	100.4
Molecular Color Index	2	5	5	1
Normative Plagioclase				
Name	Albite	Oligoclase	Albite	Oligoclase
%An	7	26	10	16

Name and location of specimen:

1 Rhyolite calcalkalic; grey quartz-feldspar phyric flow, upper sequence: from outcrop 1.4 km northeast of Ansell Lake, central part of map area.

2 Dacite, calcalkalic; grey porphyritic flow, upper sequence: from outcrop 2.5 km northeast of Ansell Lake, central part of map area.

3 Rhyolite, calcalkalic; grey porphyritic flow, upper sequence: from outcrop 0.7 km west of Syenite Lake, central part of map area.

4 Rhyolite calcalkalic; grey quartz-feldspar phyric flow, upper sequence: from outcrop.0.5 km north-northwest of Victoria Lake, cental part of map area.

Note:
Classification according to Irvine and Baragar (1971)

Table 9: Chemical analysis and specific gravity of Quetico-type wacke Schreiber-Terrace Bay Area
Major components (weight percent)

Column No.	1
Specimen No.	UU8-1
SI02	62.50
AI203	15.90
FE203	1.36
FEO	4.59
MGO	3.34
CAO	3.38
NA20	3.34
K20	2.26
TI02	0.64
P205	0.13
S	0.21
MNO	0.09
CO2	0.18
H20+	0.97
H20-	0.08
Total	98.97
SPEC. GR.	2.74
Trace elements (ppm):	
Ba	600
Co	26
Cr	166
Cu	47
LI	23
NI	75
Pb	10
Zn	84

Name and location of specimen:

1 Wacke; from outcrop 3.25 km southeast of the southeastern corner of Stingray Lake in the northeastern part of the map area.

Table 10 Molecular norm, normative colour index and normative plagioclase composition of wacke from Schreiber-Terrace Bay Area

Column No.	1
Specimen No.	UU8-1
Quartz	18.9
Corundum	2.4
Orthoclase	13.7
Albite	30.8
Anorthite	16.4
Diopside	0.0
Hedenbergite	0.0
Enstatite	9.5
Ferrosilite	5.2
Forsterite	0.0
Fayalite	0.0
Hematite	0.0
Magnetite	1.5
Ilmenite	0.9
Apatite	0.3
Pyrrhotite	0.6
Total	100.2
Molecular Color Index	17
Normative Plagioclase	
Name	Andesine
%An	35

Name and location of specimen

1 Wacke; from outcrop 3.25 km southeast of the southeastern corner of Stingray Lake in the northeastern part of the map area.

Table 11: Chemical analysis and specific gravity of metagabbros (8) and serpentinite (1), Schreiber-Terrace Bay Area

Major components (weight percent):

Column No.	1	2	3	4	5	6	7	8	9
Specimen No.	MM13-3	VV6-6	WW4-5	WW9-9	NN23-5	PP20-103	PP15-101	QQ15-15	0018-1
SIO2	49.20	51.00	49.10	47.10	45.20	49.60	48.00	49.30	38.00
AI2O3	16.80	15.60	13.70	13.90	15.00	15.80	15.30	14.20	3.33
FE2O3	3.17	2.80	2.53	5.27	3.80	2.48	1.49	1.37	7.86
FEO	8.49	8.38	7.98	9.59	9.23	8.75	8.74	8.67	3.73
MGO	9.31	5.57	9.03	5.91	9.75	6.28	7.31	7.69	34.20
CAO	8.75	9.97	11.00	7.60	8.60	10.10	11.80	11.40	1.70
NA2O	1.97	2.20	1.99	2.43	1.39	2.75	1.60	1.05	0.00
K2O	0.50	0.62	0.62	10.6	0.22	0.33	0.54	0.11	0.00
TIO2	0.91	0.92	0.73	2.79	1.23	0.93	0.67	0.76	0.40
P2O5	0.05	0.07	0.03	0.21	0.15	0.02	0.00	0.01	0.00
S	0.02	0.06	0.02	0.12	0.02	0.04	0.07	0.02	0.03
MNO	0.17	0.17	0.19	0.30	0.18	0.18	0.24	0.15	0.15
CO2	0.26	0.10	0.15	0.23	0.64	0.22	1.56	2.34	0.12
H2O+	0.85	1.45	1.63	2.49	3.78	1.42	1.96	2.56	9.74
H2O−	0.29	0.06	0.09	0.06	0.17	0.12	0.32	0.10	0.49
Total	100.74	98.97	98.79	99.06	99.36	99.02	99.60	99.73	99.75
SPEC. GR.	2.99	2.98	3.00	2.99	2.97	2.97	2.96	2.91	2.77

Trace elements (ppm)X:

	1	2	3	4	5	6	7	8	9
Ba	100	140	120	150	90	60	240	70	-10
Co	53	41	47	44	57	42	42	40	116
Cr	205	112	185	5	340	236	710	380	4000
Cu	10	85	14	53	60	120	120	72	6
Li	14	11	14	14	12	10	12	6	-3
Mo	-10	-	-	-	-3	-	-10	-3	-
Ni	250	37	65	56	263	80	117	79	1930
Pb	-10	-10	-10	-10	-10	-10	-10	-10	-10
Zn	120	68	112	150	138	86	114	83	68
Sr	200	-	-	-	-	-	180	-	-
V	135	-	-	-	-	-	250	-	-
Y	9	-	-	-	-	-	22	-	-
Zr	35	-	-	-	-	-	25	-	-

Name and location of specimen:

1 Tholeiitic metagabbro; dark grey green: from outcrop located about 2.5 km east of Lower Ross Lake, southwestern part of map area (Nicopor Occurrence).
2 Tholeiitic metagabbro; black, coarse: from outcrop 1.4 km north-northeast of Cameron Lake, northeastern part of map area.
3 Tholeiitic metagabbro; black, coarse: from outcrop 2 km west of Crossman Lake, northeastern part of map area.
4 Tholeiitic metagabbro; black, coarse: from outcrop 0.5 km southwest of Mile 15, Kimberly Clark of Canada Limited Road, south end of Aguasabon Lake, northeastern part of map area.
5 Tholeiitic metagabbro; dark green, coarse: from outcrop 1 km west-northwest of Mile 7, Kimberly Clark of Canada Limited Road, east-central part of map area.
6 Tholeiitic metagabbro; black, coarse: from outcrop 1.8 km northeast of the northern part of Hays Lake, south-central part of map area.
7 Tholeiitic metagabbro; dark green, coarse: from outcrop located about 0.7 km east of the southern end of Cook Lake, south-central part of map area.
8 Tholeiitic metagabbro; dark green, medium-grained: from outcrop located about 1 km east of Schreiber, south-central part of map area.
9 Serpentinite; from outcrop on southeast shore of Big Bruin Lake, south-central part of map area.

Note:

X Negative value denotes detection limit.
Dash alone (-) means not analysed for.

Table 12: Molecular norm, normative colour index and normative plagioclase composition of metagabbros and serpenitinite, Schreiber-Terrace Bay Area

Column No. Specimen No.	1 MM13-3	2 VV6-6	3 WW4-5	4 WW9-9	5 NN23-5	6 PP20-103	7 PP15-101	8 QQ15-5	9 OO18-1
Quartz	0.0	4.3	0.0	1.9	0.0	0.0	0.0	5.5	0.0
Corundum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Orthoclase	3.0	3.8	3.8	6.7	1.4	2.0	3.4	0.7	0.0
Albite	17.8	20.6	18.5	23.3	13.3	25.6	15.1	10.1	0.0
Anorthite	35.8	32.2	27.5	25.5	36.2	30.9	34.7	36.1	8.7
Diopside	4.2	8.9	16.2	6.7	4.5	10.3	13.6	12.6	0.0
Hedenbergite	1.9	6.2	6.8	3.9	2.1	6.4	8.0	6.9	0.0
Enstatite	20.6	11.6	13.8	14.1	22.9	12.6	13.4	16.4	18.8
Ferrosilite	9.2	8.1	5.8	8.3	10.6	7.9	7.9	9.0	2.5
Forsterite	2.4	0.0	2.9	0.0	2.7	0.2	0.8	0.0	59.3
Fayalite	1.1	0.0	1.2	0.0	1.2	0.1	0.4	0.0	7.8
Hematite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Magnetite	2.5	2.6	2.4	4.8	3.0	2.6	1.6	1.5	2.1
Ilmenite	1.3	1.3	1.1	4.1	1.8	1.3	1.0	1.1	0.6
Apatite	0.1	0.2	0.1	0.5	0.4	0.0	0.0	0.0	0.0
Pyrrhotite	0.1	0.2	0.1	0.3	0.1	0.1	0.2	0.1	0.1
Total	100.0	100.0	100.2	100.1	100.2	100.0	100.1	100.0	100.2
Molecular Color Index Normative	43	39	50	42	49	41	47	48	91
Plagioclase Name	Labradorite	Labradorite	Labradorite	Labradorite	Bytownite	Labradorite	Labradorite - bytownite	Bytownite	
%An	67	61	60	52	73	55	70	78	

Name and location of specimen:

1 Tholeiitic metagabbro; dark grey green: from outcrop located about 2.5 km east of Lower Ross Lake, southwestern part of map (Nicopor Occurrence).
2 Tholeiitic metagabbro; black, coarse: from outcrop 1.4 km north-northeast of Cameron Lake, northeastern part of map area.
3 Tholeiitic metagabbro; black, coarse: from outcrop 2 km west Crossman Lake, northeastern part of map area.
4 Tholeiitic metagabbro; black, coarse: from outcrop 0.5 km southwest of Mile 15, Kimberly Clark of Canada Limited Road, south end of Aguasabon Lake, northeastern part of map area.
5 Tholeiitic metagabbro; dark green, coarse: from outcrop 1 km west-northwest of Mile 7, Kimberly Clark of Canada Ltd. road, east-central part of map area.
6 Tholeiitic metagabbro; black, coarse: from outcrop 1.8 km northeast of the northern part of Hays Lake, south-central part of map area.
7 Tholeiitic metagabbro; dark green, coarse: from outcrop located 0.7 km east of the southern end of Cook Lake, south-central part of map area.
8 Tholeiitic metagabbro; dark green, medium-grained: from outcrop located 1 km east of Schreiber south-central part of the map area.
9 Serpentinite: from outcrop on southeast shore of Big Bruin Lake, south-central part of map area.

Table 13: Modal analysis (volume percent) of minerals in phases of the Crossman Lake Batholith, Schreiber-Terrace Bay Area

Column Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Specimen Number	XX6-2	WW2-1	MM6-11	MM6-21	MM21-12	XX4-1	NN20-22	MM17-2	MM21-8	NN16-4	MM21-6	0020-1	0018-13	0018-6
Quartz	38	33	44	22	19	34	19	33	53	12	19	18	18	8
Alkali feldspar	4	2	11	9	20	56	75	33	37	10	26	36	34	64
Plagioclase	46	59	39	64	35	0	0	0	0	63	49	42	39	0
Biotite	9	5	5	5				21	4			X	X	
Muscovite	X	X	X						2					
Apatite	X					X			X	X				
Epidote	2	X		X	7	2					1		X	8
Sphene	X			X							X			
Chlorite		X			17	6	5	X		13	3			7
Opaques			X		1	1	X		3	X	X	X		2
Calcite			X		X		1			2				X
Sericite								13						
											2	4	6	11
Total	99	99	99	100	99	99	100	100	100	100	99	100	97	100
Plagioclase Composition ($An)	33	35	24	20	21	5	0	3	0	8	15	10	11	2
Points counted	511	608	607	607	541	545	564	607	517	581	561	607	602	590

Name and location of specimen:

1 Tonalite; grey: from outcrop 3.5 km south-southeast of Cameron Lake in the northeastern part of the map area.
2 Tonalite; grey: from outcrop about 0.75 km west of the northern end of Crossman Lake, northeastern part of the map area.
3 Granodiorite; grey: from outcrop 3 km north-northwest of Sox Lake, in the northwestern part of the map area.
4 Granodiorite; grey: from outcrop 3.5 km north-northwest of Sox Lake in the northwestern part of the map area.
5 Granite; pink: from outcrop 0.75 km south of Rhumly Lake in the east-central part of the map area.
6 Alkali-feldspar granite; pink: from outcrop 1.5 km east of the southern end of Crossman Lake, northeastern part of the map area.
7 Alkali-feldspar granite; pink: from outcrop about 1 km east of Ellis Lake, in the east-central part of the map area.
8 Alkali-feldspar granite; pink: from outcrop 1.25 km east of the central part of Maude Lake, central part of map area.
9 Alkali-feldspar granite; pink porphyritic: from outcrop 100 m northeast of the northeastern shore of Ducell Lake, east-central part of map area.
10 Quartz monzodiorite; pink: from outcrop at northern end of Little Bruin Lake, central part of map area.
11 Quartz monzodiorite; pink: from outcrop on island at the southwestern shore of Ducell Lake, east-central part of the map area.
12 Quartz monzonite; pink: from outcrop on southern shore of Ellis Lake, east-central part of map area.
13 Quartz monzonite; pink: from outcrop on eastern shore of Big Bruin Lake, central part of map area.
14 Quartz alkali-feldspar syenite: from outcrop on southwestern shore of Big Bruin Lake, central part of map area.

Notes:

1. X denotes less than 1 percent to trace of the mineral present.
2. Classification according to Streckeisen (1976).

Table 14: Chemical analysis and specific gravity of granitic rocks from the Crossman Lake Batholith, Schreiber-Terrace Bay Area
Major components (weight percent):

Column No.	1	2	3
Specimen No.	XX6-2	MM6-21	MM21-8
S102	69.00	69.90	74.60
Al203	14.20	17.20	14.30
FE203	1.30	0.64	0.20
FEO	2.10	1.33	0.48
MGO	1.06	0.81	0.20
CAO	3.49	2.51	0.77
NA20	3.78	4.83	4.13
K20	1.85	1.74	4.39
T102	0.41	0.36	0.14
P205	0.06	0.00	0.02
S	0.01	0.01	0.01
MNO	0.06	0.04	0.02
CO2	0.11	0.37	0.37
H20+	0.63	0.54	0.43
H20-	0.10	0.31	0.08
Total	98.16	100.59	100.14
SPEC. GR.	2.70	2.82	2.61
Trace elements (ppm)x:			
Ba	380	-	510
Co	10	-	-5
Cr	11	-	6
Cu	8	-	-5
Li	19	-	7
Mo	-	13	-
Ni	14	-	-5
Pb	-10	-	25
Zn	48	-	29
Sr	-	665	-
V	-	40	-
Y	-	5	-
Zr	-	100	-

Name and location of specimen:

1 Tonalite; grey: from outcrop 3.5 km south-southeast of Cameron Lake in the northeastern part of the map area.
2 Granodiorite; grey: from outcrop 3.5 km north-northwest of Sox Lake in the northwestern part of the map area.
3 Alkali-feldspar granite; pink porphyritic: from outcrop 100 m northeast of the northeastern shore of Ducell Lake, east-central part of map area.

Notes:

Classification according to Streckelsen (1976).
X Negative value denotes detection limit.
Dash alone (-) means not analysed for.

Table 15: Molecular mesonorm, normative colour index and normative plagioclase composition of rocks from the Crossman Lake Batholith, Schreiber-Terrace Bay Area

Column No.	1	2	3
Specimen No.	XX6-2	MM6-21	MM21-8
Quartz	32.0	28.8	31.1
Corundum	0.7	4.6	2.8
Orthoclase	6.7	7.0	25.1
Albite	35.2	43.3	37.3
Anorthite	15.3	8.6	0.6
Biotite	7.4	5.2	1.6
Sphene	0.9	0.8	0.3
Calcite	0.0	1.0	1.0
Hematite	0.0	0.0	0.0
Magnetite	1.4	0.7	0.2
Ilmenite	0.0	0.0	0.0
Apatite	0.1	0.0	0.0
Pyrrhotite	0.0	0.0	0.0
Total	99.7	100.0	100.0
Molecular Color Index	9	6	2
Normative Plagioclase Name	Andesine	Oligoclase	Albite
%An	30	17	2

Name and location of specimen:

1 Tonalite; grey: from outcrop 3.5 km south-southeast of Cameron Lake in the northeastern part of the map area.
2 Granodiorite; grey: from outcrop 3.5 km north-northwest of Sox Lake in the northwestern part of the map area.
3 Alkali-feldspar granite; pink porphyritic: from outcrop 100 m northeast of the northeastern shore of Ducell Lake, east-central part of map area.

Note:

Classification according to Streckeisen (1976).

Table 16: Modal analysis (volume percent) of minerals in phases of the Whitesand Lake Batholith, Schreiber-Terrace Bay Area

Column Number	1	2	3	4
Specimen Number	PP4-1	PP9-2	NN5-6	QQ12-25
Quartz	34	22	16	12
Alkali feldspar	64	77	28	15
Plagioclase	0	0	43	48
Biotite	1		6	6
Muscovite	X			
Hornblende			5	18
Chlorite	X	1		
Epidote		X	1	
Calcite				
Apatite				X
Sphene				X
Sericite				
Opaques	X		X	X
Total	99	100	99	99
Plagioclase Composition (%An)	2	0	26	30
Points counted	543	604	567	607

Name and location of specimen:

1 Alkali-feldspar granite; pink: from outcrop along Highway 17, 3 km west of McLean's Creek, southwestern part of the map area.
2 Alkali-feldspar granite; pink: from eastern shore of Whitesand Lake, 1 km west of island in Jason Lake, southwestern part of map area.
3 Quartz monzonite; grey: from outcrop on H.E.P.C. line near southwestern end of McLean's Lake, southwestern part of the map area.
4 Monzodiorite; grey: from outcrop on western shore of Walker Lake about 0.75 km north of the southern end of the lake, southwestern part of map area.

Notes:

1. X denotes less than 1% to trace of the mineral present.
2. Classification according to Streckeisen (1976).

Table 17: Chemical analysis and specific gravity of granitic rocks of the Whitesand Lake Batholith, Schreiber-Terrace Bay Area
Major components (weight percent):

Column No.	1	2	3	4
Specimen No.	PP4-1	PP9-2	NN5-6	QQ12-25
SI02	72.70	71.20	65.60	61.50
AI203	14.30	15.90	16.70	16.90
FE203	0.19	0.48	1.65	2.50
FEO	0.58	1.00	2.33	3.33
MGO	0.39	0.85	1.74	2.75
CAO	0.73	0.68	3.21	4.33
NA20	4.25	4.17	4.13	3.86
K20	4.74	4.51	3.44	2.95
TI02	0.18	0.29	0.50	0.66
P205	0.04	0.03	0.11	0.13
S	0.02	0.01	0.01	0.02
MNO	0.02	0.03	0.07	0.10
CO2	0.28	0.41	0.14	0.31
H20+	0.43	0.52	0.48	1.16
H20-	0.19	0.20	0.27	0.17
Total	99.04	100.28	100.38	100.67
SPEC. GR.	2.62	2.62	2.68	2.77
Trace elements (ppm)†:				
Ba	800	-	-	-
Co	-5	-	-	-
Cr	-5	-	-	-
Cu	6	-	-	-
LI	30	-	-	-
Mo	-	14	13	13
NI	-5	-	-	-
Pb	55	-	-	-
Zn	40	-	-	-
Sr	-	300	900	760
V	-	15	70	125
Y	-	10	16	21
Zr	-	160	140	115

Name and location of specimen:

1 Alkali-feldspar granite; pink: from outcrop along Highway 17, 3 km west of McLean's Creek, southwestern part of the map area.
2 Alkali-feldspar granite; pink: from eastern shore of Whitesand Lake, 1 km west of Island in Jason Lake, southwestern part of map area.
3 Quartz monzonite; grey: from outcrop on H.E.P.C. line near southwestern end of McLean's Lake, southwestern part of the map area.
4 Monzodiorite; grey: from outcrop on western shore of Walker Lake about 0.75 km north of the southern end of the lake, southwestern part of map area.

Notes:

Classification according to Streckeisen (1976).
X Negative value denotes detection limit.
Dash alone (-) means not analysed for.

Table 18: Molecular mesonorm, normative colour index and normative plagioclase composition of rocks of the Whitesand Lake Batholith, Schreiber-Terrace Bay Area

Column No.	1	2
Specimen No.	RN5-6	QQ12-25
Quartz	21	18.9
Corundum	1.8	1.6
Orthoclase	14.2	8.2
Albite	37.2	34.9
Anorthite	12.5	16.3
Biotite	9.8	14.9
Sphene	1.0	1.4
Calcite	0.4	0.9
Hornblende	0.0	0.0
Pyrite	0.0	0.1
Hematite	0.0	0.0
Magnetite	1.7	2.6
Ilmenite	0.0	0.0
Apatite	0.2	0.3
Pyrrhotite	0.0	0.0
Total	99.5	100.1
Molecular Color Index	12	18
Normative Plagioclase		
Name	Oligoclase	Andesine
%An	25	32

Name and location of specimen:

1 Quartz monzonite; gret: from outcrop on H.E.P.C. line near southwestern end of McLean's Lake, southwestern part of the map area.

2 Monzodiorite; grey: from outcrop on western shore of Walker Lake about 0.75 km north of the southern end of the lake, southwestern part of map area.

Table 19: Modal analysis (volume percent) of minerals in phases of the Terrace Bay Batholith, Schreiber-Terrace Bay Area

Column Number	1	2	3	4	5	6
Specimen Number	PP24-6	RR11-200	RR17-3	RR15-1	RR15-3	SS5-1
Quartz	21	31	33	18	12	8
Alkali feldspar	68	65	8	43	13	0
Plagioclase	0	0	51	36	58	65
Biotite	X	X	5	X	14	6
Muscovite	X					
Hornblende			4	3	1	18
Chlorite		3				2
Epidote	2					1
Calcite	7					
Apatite						
Sphene						
Sericite						
Opaques	1			X	1	1
Total	99	99	101	100	99	100
Plagioclase Composition (%An)	0	0	13	20	22	Phenocrysts:21-67 Matrix:43
Points counted	560	558	607	576	608	1029

Name and location of specimen:

1 Alkali-feldspar granite; pink: from outcrop at the granite-metavolcanics contact, 2 km southwest of the southern end of Bews Lake, in the southeastern part of the map area.

2 Alkali-feldspar granite; pink: from outcrop at the granite-metavolcanics contact, 1 km southwest of the southwestern end of Hays Lake, in the south-central part of the map area.

3 Granodiorite; pink: from outcrop 2.5 km northeast of the town of Terrace Bay, in the southeastern part of the map area.

4 Quartz monzonite; grey: from outcrop 1.5 km west of the town of Terrace Bay, in the southeastern part of the map area.

5 Quartz monzodiorite; grey: from outcrop 2.5 km southwest of the town of Terrace Bay, in the southeastern part of the map area.

6 Quartz diorite; grey: from outcrop 1 km east of the northwestern end of Worthington Bay, at the southern margin of the central part of the map area.

Notes:

1. X denotes less than 1% to trace of the mineral present.
2. Classification according to Streckelsen (1976).

Table 20: Chemical analysis and specific gravity of porphyries and lamprophyres from the Terrace Bay Batholith, Schreiber-Terrace Bay Area
Major components (weight percent):

Column No.	1	2	3	4	5	6
Specimen No.	QQ16-12	RR10-102	PP20-108	SS5-1	RR12-4	RR11-10
S102	66.00	70.60	69.70	57.80	56.10	50.30
A1203	15.50	15.70	16.20	17.50	15.50	12.70
FE203	0.63	0.33	0.00	3.23	2.62	3.65
FEO	2.75	0.97	2.62	3.81	3.97	4.30
MGO	3.68	0.70	1.14	3.47	4.85	7.51
CAO	3.90	2.16	3.20	5.71	5.33	6.79
NA20	4.75	4.93	5.01	3.97	3.66	2.43
K20	0.87	1.90	0.54	2.07	2.30	2.71
T102	0.35	0.37	0.46	0.68	0.94	0.75
P205	0.06	0.02	0.09	0.16	0.60	0.48
S	0.03	0.04	0.02	0.01	0.03	0.03
MNO	0.06	0.02	0.04	0.11	0.10	0.15
C02	0.51	1.45	0.16	0.16	1.43	4.24
H20+	1.40	0.98	1.30	1.41	2.39	3.43
H20-	0.13	0.15	0.12	0.09	0.22	0.40
Total	100.62	100.32	100.60	100.18	100.04	99.94
SPEC. GR.	2.68	2.66	2.68	2.80	2.77	2.74
Trace elements (ppm)t:						
Ba	430	490	460	582	980	860
Co	14	5	10	20	22	30
Cr	169	23	17	28	116	480
Cu	24	6	52	12	38	51
LI	10	8	5	14	33	55
Mo	-3	-3	-	-3	-3	-3
NI	68	7	13	8	60	90
Pb	-10	-10	-10	-10	12	-10
Zn	59	28	42	87	113	120
Rb	20	60	-	60	-	90
Sr	670	460	-	740	-	820
V	-	-	-	-	-	-
Y	-	-	-	-	-	-
Zr	-	-	-	-	-	-

Name and location of specimen:

1 Quartz-feldspar porphyry; grey: from outcrop 1 km west of southwestern corner of Hays Lake, in the south-central part of map area.
2 Quartz-feldspar porphyry; grey: from outcrop 2.5 km southwest of southwestern corner of Hays Lake, in the south-central part of map area.
3 Quartz-feldspar porphyry; grey: from outcrop 1.25 km east of the northern end of Hays Lake, in the southeastern part of map area.
4 Hornblende porphyry; grey: from outcrop 1 km east of the northwestern end of Worthington Bay, in the southern margin of the central part of map area.
5 Hornblende lamprophyre; brown: from outcrop 2 km southwest of the northwestern end of Terrace Bay, in the southeastern part of map area.
6 Biotite lamprophyre; brown: from outcrop 2 km west of the northwestern end of Terrace Bay, in the southeastern part of map area.

Notes:

† Negative value denotes detection limit.
Dash alone (-) means not analysed for.

Table 21: Molecular mesonorm, normative colour index and normative plagioclase composition of porphyries and lamprophyres from the Terrace Bay Batholith, Schreiber-Terrace Bay Area

Column No.	1	2	3	4	5	6
Specimen No.	QQ16-12	RR10-102	PP20-108	SS5-1	RR12-4	RR11-10
Quartz	22.6	32.0	28.8	15.0	19.3	21.1
Corundum	1.7	6.0	3.0	0.0	4.0	6.4
Acmite	0.0	0.0	0.0	0.0	0.0	0.0
Orthoclase	0.0	8.6	0.0	1.1	0.0	22.3
Albite	42.6	44.2	45.3	36.1	33.4	0.0
Anorthite	14.2	0.0	12.7	24.1	9.5	26.1
Biotite	8.2	4.2	5.1	18.1	22.1	0.7
Sphene	0.7	0.3	1.0	1.4	2.0	12.0
Calcite	1.4	4.0	0.4	0.5	4.0	0.0
Hornblende	0.0	0.0	0.0	0.0	0.0	0.0
Hypersthene	7.8	0.0	3.4	0.0	1.5	6.0
Pyrite	0.1	0.1	0.1	0.0	0.1	0.1
Hematite	0.0	0.0	0.0	0.0		0.0
Magnetite	0.7	0.3	0.0	3.4	2.8	3.9
Apatite	0.1	0.0	0.2	0.3	1.3	1.0
Total	100.0	99.7	100.0	100.0	100.0	99.6
Molecular Colour Index	16	4	9	22	26	36
Normative Plagioclase Name	Oligo-clase	Albite	Oligo-clase	Andesine	Oligo-clase	Albite
%An	25	0	22	40	22	0

Name and location of specimen:

1 Quartz-feldspar porphyry; grey: from outcrop 1 km west of southwestern corner of Hays Lake, in the south-central part of map area.
2 Quartz-feldspar porphyry; grey: from outcrop 2.5 km southwest of southwestern corner of Hays Lake, in the south-central part of map area.
3 Quartz-feldspar porphyry; grey: from outcrop 1.25 km east of the northern end of Hays Lake, in the southeastern part of map area.
4 Hornblende porphyry; grey: from outcrop 1 km east of the northwestern end of Worthington Bay, in the southern margin of the central part of map area.
5 Hornblende lamprophyre; brown: from outcrop 2 km southwest of the northwestern end of Terrace Bay, in the southeastern part of map area.
6 Biotite lamprophyre; brown: from outcrop 2 km west of the northwestern end of Terrace Bay, in the southeastern part of map area.

Table 22: Modal analysis (volume percent) of minerals in phases of Mount Gwynne Pluton, Schreiber-Terrace Bay Area

Column Number	1	2	3	4	5	6
Specimen Number	RR8-117	RR8-7	RR8-114	SS3-2	RR8-106	RR8-118
Quartz	20	23	19	10	5	4
Alkali feldspar	77	21	18	10	0	65
Plagioclase		43	48	59	56	0
Biotite		X	11	6		1
Muscovite						
Hornblende			2	12	39*	X
Chlorite	3	8		2		8
Epidote	X		X			10
Calcite		2		X		
Apatite						
Sphene			X			X
Sericite						9
Opaques		2	X	X		2
Total	100	99	98	99	100	99
Plagioclase composition (%An)	3	16	32	20	too altered	0
Points counted	556	565	608	532	568	561

Name and location of specimen:

1 Alkali-feldspar granite; pink: from outcrop 0.5 km northeast of Schreiber Beach, Collingwood Bay, in the southwestern part of the map area.
2 Granodiorite; pink: from outcrop about 1.5 km east of Schreiber Beach, Collingwood Bay, in the southwestern part of the map area.
3 Granodiorite; pink: 0.25 km northwest of Fourth Lake, in the central part of Schreiber Peninsula, in the southwestern part of the map area.
4 Quartz monzonite; pink: from outcrop about 0.75 km southwest of Fourth Lake, Schreiber Peninsula, in the southwestern part of the map area.
5 Quartz diorite; grey: from peak of Gwynne Mountain, Schreiber Peninsula, in the southwestern part of the map area.
6 Quartz alkali-feldspar syenite; alkalic, dark grey: from outcrop 0.5 km northeast of Schreiber Beach, Collingwood Bay, in the southwestern part of the map area.

Notes:

1. X denotes less than 1% to trace of the mineral present.
2. Classification according to Streckeisen (1976).
* Actinolite.

Table 23: Chemical analysis and specific gravity of granitic rocks from the Mount Gwynne Pluton, Schreiber-Terrace Bay Area
Major components (weight percent):

Column No.	1	2	3	4	5
Specimen No.	RR8-117	RR8-114	SS3-2	RR8-106	RR8-118
S102	70.20	63.70	60.90	54.20	63.80
A1203	15.50	16.80	17.30	15.80	15.40
FE203	1.23	1.83	2.78	1.11	1.39
FEO	1.25	2.50	3.08	5.66	1.50
MGO	1.05	2.18	3.05	9.26	2.16
CAO	0.44	3.07	3.56	6.31	2.83
NA20	4.77	4.01	4.56	3.45	7.65
K20	4.43	2.92	2.32	0.87	4.11
T102	0.38	0.55	0.60	0.36	0.40
P205	0.02	0.12	0.21	0.0	0.01
S	0.01	0.02	0.01	0.01	0.05
MNO	0.04	0.08	0.11	0.12	0.06
CO2	0.38	0.45	0.46	0.30	0.42
H20+	0.47	0.75	1.29	1.54	0.34
H20-	0.27	0.55	0.25	0.32	0.30
Total	100.44	99.53	100.48	99.31	100.42
SPEC. GR.	2.62	2.70	2.73	2.80	2.68
Trace elements (ppm):					
Ba	-	-	-	-	220
Co	-	-	-	-	7
Cr	-	-	-	-	14
Cu	-	-	-	-	28
LI	-	-	-	-	48
Mo	14	13	13	-10	-10
NI	-	--	-	-	5
Pb	-	-	-	-	-10
Zn	-	-	-	-	59
Sr	310	760	900	515	230
V	35	85	115	95	40
Y	15	17	19	6	10
Zr	135	85	85	60	220

Name and location of specimen:

1 Alkali-feldspar granite; pink: from outcrop 0.5 km northeast of Schreiber Beach, Collingwood Bay, in the southwestern part of the map area.
2 Granodiorite; pink: 0.25 km northwest of Fourth Lake, in the central part of Schreiber Peninsula, in the southwestern part of the map area.
3 Quartz monzonite; pink: from outcrop about 0.75 km southwest of Fourth Lake, Schreiber Peninsula, in the southwestern part of the map area.
4 Quartz diorite; grey: from peak of Gwynne Mountain, Schreiber Peninsula, in the southwestern part of the map area.
5 Quartz alkali-feldspar syenite; alkalic, dark grey: from outcrop 0.5 km northeast of Schreiber Beach, Collingwood Bay, in the southwestern part of the map area.

Note:
Classification according to Streckeisen (1976).

Table 24: Molecular mesonorm, normative colour index and normative plagioclase composition of rocks from the Mount Gwynne Pluton, Schreiber-Terrace Area

Column No.	1	2	3	4	5
Specimen No.	RRB-117	RRB-114	SS3-2	RRB-106	RRB-118
Quartz	23.5	23.3	18.9	3.6	2.8
Corundum	3.1	4.0	3.6	0.0	0.0
Orthoclase	22.7	10.2	4.2	0.0	18.6
Albite	42.7	36.6	41.1	31.1	57.8
Anorthite	0.0	9.6	11.0	25.1	0.0
Biotite	5.3	11.8	15.3	8.3	7.8
Sphene	0.0	1.2	1.3	0.8	0.8
Calcite	0.9	1.3	1.3	0.8	1.1
Amphibole	0.0	0.0	0.0	4.4*	5.4†
Hypersthene	0.0	0.0	0.0	24.7	0.0
Wollastonite	0.0	0.0	0.0	0.0	3.7
Pyrite	0.0	0.1	0.0	0.0	0.1
Hematite	0.0	0.0	0.0	0.0	0.2
Magnetite	1.3	1.9	2.9	1.2	0.0
Apatite	0.0	0.3	0.4	0.0	0.0
Total	99.5	100.3	99.6	100	98.3
Molecular Color Index	6	14	18	39	14
Normative Plagioclase					
Name	Albite	Oligo-clase	Oligo-clase	Andesine	Albite
%An	0	21	21	45	0

Name and location of specimen:

1 Alkali-feldspar granite; pink: from outcrop 0.5 km northeast of Schreiber Beach, Collingwood Bay, in the southwestern part of the map area.
2 Granodiorite; pink: 0.25 km northwest of Fourth Lake, in the central part of Schreiber Peninsula, in the southwestern part of the map area.
3 Quartz monzonite; pink: from outcrop about 0.75 km southwest of Fourth Lake, Schreiber Peninsula, in the southwestern part of the map area.
4 Quartz diorite; grey: from peak of Gwynne Mountain, Schreiber Peninsula, in the southwestern part of the map area.
5 Quartz alkali-feldspar syenite; alkalic, dark grey: from outcrop 0.5 km northeast of Schreiber Beach, Collingwood Bay, in the southwestern part of the map area.

Notes:

* Actinolite
† Riebeckite

Table 25: Modal analysis (volume percent) of minerals in Stingray Lake Stock and Aguasabon Lake Batholith, Schreiber-Terrace Bay Area

	Stingray Lake Stock	Aguasabon Lake Batholith
Column Number	1	2
Specimen Number	TT8-2	UU11-4
Quartz	20	13
Alkali feldspar	27	36
Plagioclase	35	37
Biotite	13	0
Muscovite	0	0
Hornblende	0	0
Chlorite	0	13
Epidote	X	X
Calcite	0	0
Apatite	1	X
Sphene	X	0
Sericite	0	0
Opaques	2	X
Total	98	100
Plagioclase Composition (%An)	24	21
Points counted	607	577

Name and location of specimen:

1 Granite; pink - Stingray Stock: from outcrop 0.5 km northeast of the southeastern end of Stingray Lake, in the northeastern part of the map area.
2 Quartz monzonite; grey - Aguasabon Lake Batholith: from outcrop about 1 km east of the middle part of Aguasabon Lake, in the northeastern part of the map area.

Notes:

1. X denotes less than 1% to trace of the mineral present.
2. Classification according to Streckeisen (1976).

Table 26: Chemical analysis and specific gravity of rocks from diabase and lamprophyre dikes in the Schreiber-Terrace Bay Area

Major components (weight percent):

Column No.	1	2	3	4	5	6	7	8	9	10
Specimen No.	LL24-8	WW6-5	RR14-3	VV6-9	UU6-1	SS6-8	0026-3	XX10-13	WW13-3	RR11-201
SIO2	49.80	49.00	49.00	49.90	47.90	51.60	49.70	45.80	46.90	52.70
AI2O3	13.30	13.60	12.10	13.90	13.90	14.60	14.30	11.40	11.60	11.70
FE2O3	3.56	4.20	5.80	2.89	3.09	3.30	2.80	6.48	4.74	2.34
FEO	10.70	10.60	11.10	10.10	10.20	9.72	9.88	12.30	12.80	3.65
MGO	5.82	5.54	3.72	6.31	7.38	5.70	6.16	4.02	3.76	7.49
CAO	9.78	9.53	8.23	9.38	9.89	9.17	9.48	6.98	7.35	5.55
NA2O	2.28	2.26	2.36	2.16	1.94	2.29	1.98	3.05	3.40	3.17
K2O	0.63	0.73	1.04	1.11	1.20	0.66	1.17	1.49	1.04	3.48
TIO2	1.53	1.42	3.80	1.10	0.99	1.88	1.48	3.72	3.55	0.77
P2O5	0.09	0.11	0.48	0.10	0.06	0.15	0.10	0.38	0.60	0.58
S	0.11	0.10	0.11	0.12	0.12	0.02	0.11	0.10	0.19	0.20
MNO	0.22	0.22	0.24	0.19	0.22	0.19	0.19	0.27	0.25	0.10
CO2	0.36	0.10	0.22	0.25	0.06	0.11	0.21	0.12	0.16	6.19
H2O+	1.65	1.49	1.41	1.54	1.76	0.59	2.31	2.43	2.15	1.43
H2O-	0.13	0.16	0.39	0.10	0.10	0.29	0.22	0.15	0.13	0.19
Total	99.96	99.06	100.00	99.15	98.81	100.27	100.09	98.69	98.62	99.54
SPEC. GR.	3.04	3.00	3.00	3.02	3.05	2.98	3.02	3.03	3.01	2.75
Trace elements (ppm)x:										
Ba	190	210	440	270	190	240	210	620	260	1140
Co	49	48	39	53	55	42	54	42	42	30
Cr	106	94	-5	131	147	119	104	14	8	460
Cu	157	172	200	124	156	135	82	49	38	52
LI	14	12	8	17	14	6	24	13	11	35
Mo	-	-	-3	-	-	-3	-	-	-	-
NI	55	57	14	86	103	71	55	21	19	131
Pb	-10	-10	-10	-10	-10	-10	-10	-10	-10	14
Zn	138	138	165	120	122	126	118	240	170	90

Name and location of specimen:

DIABASE DIKES

East-west dikes

1 Tholeiitic diabase: from east-west dike located 1 km west of Mile 11, Kimberly Clark of Canada Ltd. road, east-central part of the map area.
2 Tholeiitic diabase: from east-west dike located near the east shore of Cameron Lake, in the northeastern part of the map area.
3 Tholeiitic diabase: from east-west dike located at the east shore of Terrace Bay, north shore of Lake Superior.

Northwest-southeast dikes

4 Tholeiitic diabase: from northwesterly dike 0.8 km north of Cameron Lake, in the northeastern part of the map area.
5 Tholeiitic diabase: from northwesterly dike 2 km east-southeast of Graphite Lake (local name), in the northeastern part of the map area.

North-south dike

6 Tholeiitic diabase: from north-south dike along north shore of Lake Superior, west side of Terrace Bay.

Northeast-southwest dikes

7 Tholeiitic diabase: from northeast-southwest dike 1.3 km east-southeast of the southern end of Bews Lake, in the southeastern part of the map area.
8 Tholeiitic diabase: from northeast-southwest dike 1.1 km east of the northern end of the northern half of Lower Lake, in the northeastern part of the map area.
9 Tholeiitic diabase: from northeast-southwest dike 1.7 km west of the southern third of Owl Lake, in the northeastern part of the map area.

LAMPROPHYRE DIKE

10 Biotite lamprophyre, mauve: from outcrop of dike 1.5 km west of the southwestern shore of Hays Lake, in the south-central part of the map area, at Gold Range Mine.

Note:

x Negative value denotes detection limit.
Dash alone (-) means not analysed for.

Table 27: Molecular norm, normative colour index and normative plagioclase composition of samples from diabase andalamprophyre dikes, Schreiber-Terrace Bay Area

Column No.	1	2	3	4	5	6	7	8	9	10
Specimen No.	LL24-8	WW6-5	RR14-3	VV6-9	UU6-1	SS6-8	0026-3	XX10-13	WW13-3	RR11-201
Quartz	2.7	1.6	8.4	1.4	0.0	5.8	2.5	0.0	1.3	1.5
Corundum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Orthoclase	3.9	4.5	6.6	6.9	7.4	4.0	7.2	9.6	6.6	22.1
Albite	21.4	21.4	22.7	20.3	18.2	21.2	18.6	29.8	33.0	30.6
Anorthite	25.3	26.2	20.7	26.1	26.9	28.5	27.9	14.2	14.4	8.0
Diopside	10.9	9.5	8.3	10.1	11.5	8.4	9.9	7.9	7.8	12.3
Hedenbergite	9.0	8.9	7.4	7.4	7.7	5.5	6.6	8.7	8.8	1.7
Enstatite	11.4	11.4	6.8	13.2	10.0	12.0	12.9	8.1	7.3	16.1
Ferrosilite	9.4	10.7	6.0	9.7	6.7	7.9	8.6	9.0	8.2	2.3
Forsterite	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0
Fayalite	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0
Hematite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Magnetite	3.3	3.2	5.9	2.8	2.7	3.6	3.1	5.9	5.4	2.5
Ilmenite	2.2	2.1	5.7	1.6	1.4	2.7	2.2	5.6	5.3	1.2
Apatite	0.2	0.3	1.2	0.2	0.1	0.4	0.2	1.0	1.5	1.5
Pyrrhotite	0.3	0.3	0.3	0.3	0.3	0.1	0.3	0.3	0.5	0.6
Total	100.0	100.1	100.0	100.0	99.9	100.1	101.8	99.1	100.1	100.4
Molecular Color Index	46	46	40	45	47	40	43	45	43	36
Normative Plagioclase Name	Labradorite	Labradorite	Andesine	Labradorite	Labradorite	Labradorite	Labradorite	Andesine	Oligoclase	Oligoclase
%An	54	55	48	56	60	57	60	32	30	21

Name and location of specimen:

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MAPS
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